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JOFFILY (J. M.). **Bacteriose das folhas da Mamoneira.** [Bacteriosis of Castor leaves.]—*Rodriguésia*, ix, 19, pp. 21–24, 2 pl., 1945. (Issued 1946.)

The foliar bacteriosis of castor (*Ricinus communis*) caused by *Bacterium ricinicola* [*R.A.M.*, xiii, p. 565] is recorded from Rio de Janeiro, Brazil. Inoculations on healthy castor plants gave positive results, and the pathogen was reisolated from the infected tissues.

MOESZ (G. v.). **Pilze aus dem westlichen Gebiete Ungarns.** [Fungi from the western region of Hungary.]—*Arb. ung. biol. ForschInst.*, xiii, pp. 175–186, 1941. [Hungarian summary. Received 1946.]

An annotated list is given of 164 fungi of western Hungary, of which 95 are new records for the region.

WICKERHAM (L. J.). **A critical evaluation of the nitrogen assimilation tests commonly used in the classification of yeasts.**—*J. Bact.*, lii, 3, pp. 293–301, 2 figs., 1946.

The ability of yeasts to utilize ammonium sulphate, urea, asparagin, and peptone has served for the past 12 years as a criterion for their classification [*R.A.M.*, xiv, p. 192]. The author's studies at the Northern Regional Research Laboratory, Peoria, Illinois, have demonstrated that nine species, previously designated as incapable of assimilating the first three compounds, can do so on the addition to a modification of Lodder's medium of an adequate supply of pure vitamins. Urea proved to be toxic to nine out of ten species of *Candida* at 0·092 per cent., at which concentration only *C. flareri* continued to grow; all developed normally in the presence of 0·046 per cent.

TEIXEIRA (A. R.). **Himenomicetos brasileiros. Hymeniales–Thelephoraceae.** [Brazilian Hymenomycetes. Hymeniales–Thelephoraceae.]—*Bragantia, S. Paulo*, v, 7, pp. 398–434, 16 pl., 1945.

Included in this annotated list of the Thelephoraceae of Brazil is *Stereum frustulosum* on *Astronium fraxinifolium*.

VIÉGAS (A. P.). **Uns poucos fungos do Brasil.** [A few fungi of Brazil.]—*Bragantia, S. Paulo*, v, 9, pp. 561–582, 12 pl., 1945.

This critically annotated list comprises 13 Brazilian fungi, including *Leptosphaeria agaves* Syd. & Butl. on *Agave* sp. and *Uromyces phaseoli longepedunculati* n.f. on *Phaseolus longepedunculatus*. The uredospores of the new form of the bean rust are nearly smooth, with pores on or near the equator, and the pedicels of the smooth-walled teleutospores are longer than the spores themselves.

SINGER (R.). **The Boletineae of Florida with notes on extralimital species. IV. The lamellate families (Gomphidiaceae, Paxillaceae, and Jugasporaceae).**—*Farlowia*, ii, 4, pp. 527–567, 1 pl., 1946.

The author presents his fourth contribution, the third of which is in the press, to the study of the Boletineae of Florida, listing species with critical annotations,

subspecies, extralimital species, and species excludendae of the families Gomphidiaceae, Paxillaceae, and Jugasporaceae, and giving keys to the genera and species.

STEVENSON (J. A.). **A nomenclatorial discussion of Ustilago striiformis.**—*Plant Dis. Reptr*, xxx, 2, pp. 53–59, 1946. [Mimeographed.]

In recent years some mycologists have used the binomial *Ustilago linearis* (Dozy & Molk.) Cif. instead of *U. striiformis* (West.) Niessl for the fungus causing the common stripe smut of American grasses. The usage apparently originated with Ciferri (*Flora Italica Cryptogama*, fasc. 17, 339, 1938), who based the new combination on '*Caeoma lineare* Dozy & Molk. *Tijdschr. Natuurgesch. Physiol.*, xi, p. 407, 1844', the authors of which properly attributed it to Link. The fungus described by Link (syn. *Uredo linearis* Pers.) is generally considered to be a rust and from the description could not possibly be the leaf smut under discussion.

The specific epithet *striiformis* for the stripe smut fungus was set up by Westendorp (*Bull. Acad. Belg. Cl. Sci.*, xviii, p. 406, 1852), who stated that *U. striiformis* occurred on the young shoots of *Holcus lanatus* and *Anthoxanthum odoratum*. Niessl (*Hedwigia*, xv, p. 1, 1876) transferred the species to *Ustilago*. Earlier, however, Berkeley and Broome (*Ann. Mag. nat. Hist.*, Ser. 2, v, p. 463, 1850) had described as a new species *U. salvei*, forming elongated, parallel, black sori on the upper surface of leaves of *Dactylis glomerata*. De Toni (Sacc., *Syll. Fung.*, vii, p. 485, 1885) considered this a synonym of *Tilletia striiformis* and Liro (*Die Ustilagineen Finnlands*, i, pp. 75–76, 1922) used the name for a smut on *Dactylis glomerata* which he considered distinct from *U. striiformis* on *Holcus* and other grasses. He also cited a dozen other workers who used the name this way. Examination of Berkeley and Broome's type specimen at Kew indicated that the host is apparently *H. lanatus* and that the fungus agrees with *U. striiformis*. It would, however, be most unfortunate to substitute the relatively little-known and generally misapplied epithet *salvei* for the widely used and descriptive *striiformis*, and the writer prefers to consider the former a *nomen ambiguum* under Article 62 of the Rules.

TRAVERSI (BLANCA A.). **Inclusiones celulares de Nicotiana virus 1 en Nicotiana tabacum.** [Cellular inclusions of *Nicotiana* virus 1 in *Nicotiana tabacum*.]—*An. Soc. cien. Argent.*, cxlii, 3, pp. 97–103, 3 pl., 1946. [English summary.]

The cells of tobacco plants artificially infected by the tobacco-mosaic virus were found, on examination at the Institute of Plant Hygiene of the Ministry of Agriculture, Buenos Aires, to contain crystalline and amorphous or viroplast inclusions, appearing about ten days after inoculation and vanishing after 20 to 22 days. Trypan blue and phloxine [*R.A.M.*, xxi, p. 90] proved excellent for the selective staining of the virus, imparting a pink or purple coloration to the viroplasts and bringing the crystals into relief.

PASCALET (P.). **Étude d'une maladie à virus sur Tabac, variété Deli-Sumatra, à la plantation de Batchinga (région Nyong et Sanaga).** [A study on a virus disease of Tobacco of the Deli-Sumatra variety in the Batchinga plantation (region of Nyong and Sanaga).]—*Rev. Bot. appl.*, xxi, 235–236, pp. 110–122, 1941. [Received October, 1946.]

Cape tobacco of the Deli-Sumatra variety growing at Batchinga, in the Cameroons, showed sporadic disease in 1935; a year later more than twice as many plants were affected, and in 1937 heavy losses were sustained, the disease also being present for the first time in the nurseries. Observations by the writer showed that the condition was apparently identical with the virus diseases known in Sumatra and Java as krulziekte ('frisure' or 'leaf curl') and kroepoekziekten

('feuilles gaufrées' or 'crinkle') [? tobacco leaf-curl virus: *R.A.M.*, xi, p. 478; xxi, p. 167], while the usual type of mosaic was noted on self-sown seedlings. The disease began on nursery seedlings at the three-leaf stage as mosaic and then developed into the more serious forms of leaf-curl crinkle. When the first picking was made, 40 to 45 days after planting, some plants already showed the three forms of the disease, the proportion showing leaf curl becoming progressively higher and the symptoms more marked as the plants aged. The percentages of affected plants at the picking of the lowest, middle, and top leaves were, respectively, 5, 20, and up to 100. At the final picking the symptoms [which are fully described] had reached their fullest development. The affected plants were much more susceptible than healthy ones to infection by *Cercospora* [*nicotianae*].

Locally, the principal vector of leaf curl and crinkle would appear to be the white fly, *Bemisia* [*gossypiperda* var.] *mosaicivecta*; *Macrosiphum tabaci* and *Aphis* [*Myzus*] *persicae*, which transmit mosaic, are less important. Other insects also may be implicated.

As plants only ten days old show the condition the author considers that the disease may, possibly, be seed-borne [cf. loc. cit. and ibid., xxiii, p. 215]; new seed must be imported, and a selection site made at least 10 km. distant from the plantation. Topping should be carried out, and all topped heads and old stalks should be burnt. If the disease persists, tobacco should be followed by *Mimosa invisa* in a three-year rotation. Active steps must be taken to suppress insect infestation. To render the virus inactive the soil should be adjusted to pH 7·8 or 7·9 by liming three months before planting, heated to 80° to 90° C. to a depth of 10 cm., and deeply dug over. In the nurseries powdered wood charcoal, and formalin, phenic acid, or lysol in weak doses are recommended. Cucumber extracts have a depressing action on viruses, and cucumbers should be grown in affected areas, or the nurseries treated with dilutions of such extracts.

FOSTER (R. E.). **The first symptom of Tomato wilt : clearing of the ultimate veinlets in the leaf.**—*Phytopathology*, xxxvi, 9, pp. 691–694, 1 fig., 1946.

An even earlier symptom of tomato wilt (*Fusarium oxysporum* f. *lycopersici*) [*F. bulbigenum* var. *lycopersici*] than the epinasty described by Wellman [*R.A.M.*, xx, p. 386] is a clearing of the ultimate veinlets of the leaflets, inducing a 'netted' appearance which is perceptible only under transmitted light. In an intensive study at the Wisconsin Agricultural Experiment Station of 50 young plants inoculated with a virulent strain of the pathogen and held under optimum moisture and temperature (28° C.) conditions for wilt development, veinlet-clearing frequently appeared 24 hours after inoculation. The terminal leaflet of the third leaf was usually the first to lose the green colour, followed in another 12 hours by the second and fourth leaves and subsequently (within 48 hours of infection) by all the rest. The pallor soon progressed along all the veinlets and extended into the 'vein-islets', which looked darker green just before clearing. With the spread of the clearing from the veinlets, yellow areas developed in the leaf and later coalesced, giving rise to the 'yellow-leaf' symptom of the disease. Epinasty did not develop in any of the plants until 72 hours after inoculation, and in most it was first apparent after 84. Veinlet-clearing seems to be exclusively associated with the effects of *F. bulbigenum* var. *lycopersici* on its host, being absent from uninoculated plants kept under comparable conditions. The fungus could not be isolated from the affected leaf areas 36 hours after inoculation, and attempts to infect healthy tomato and tobacco foliage with the expressed juice of diseased leaflets also gave negative results.

Veinlet-clearing has been observed in the Bonny Best, Marglobe, Master Marglobe, and Rutgers varieties under diverse environmental conditions, but not in the highly resistant Red Currant tomato (*Lycopersicon pimpinellifolium*) or in

hybrids with a similar reaction. The early symptom of wilt was induced by three strains of the fungus, namely, R5–6, a virulent, raised isolate, A15–8, mild and adpressed, both supplied by F. L. Wellman [ibid., xx, p. 91], and one of intermediate pathogenicity from J. B. Kendrick, California. Fisher's method of inoculation [ibid., xv, p. 406] was used in a number of trials, in which Bonny Best plants were grown in soil to the five- to six-leaf stage, dug, the roots cut off under water, and the stems placed in filter-sterilized Richard's solution staled by the growth for varying periods of virulent strains of the pathogen. Veinlet-clearing developed only in plants placed in the medium from an agitated 28-hour culture.

Precocious symptoms of tomato wilt have been of considerable value in greenhouse and laboratory studies and are of interest in connexion with a somewhat unfamiliar phase of pathogenesis. The appearance of a pathological symptom in the aerial system of a plant only 24 hours after root inoculation indicates that a toxin is secreted at or very shortly after the moment of penetration, and certainly before the establishment of the organism in the host tissues. It is not yet clear whether the veinlet-clearing toxin is produced by the fungus or by the plant in reaction to invasion, but the former explanation is regarded as the more plausible of the two.

Vitoria (E. R.). **La 'estria negra' del Tomate.** [The 'black streak' of Tomato.]—*Publ. misc. Minist. Agric., B. Aires*, Ser. A, ii, 14, 20 pp., 9 figs., 1946. [English summary.]

Experimental evidence is adduced in proof of the implication of two viruses, namely, those of tobacco mosaic and potato virus X [*R.A.M.*, xxii, p. 82], in the etiology of the tomato disease characterized in Argentina by the symptoms of streak, which has commonly been confused with the so-called 'pesta nigra' [black pest], apparently a manifestation of spotted wilt [ibid., xxi, p. 481]. To obviate further ambiguity the author proposes to designate as 'estria negra' [black streak] the disease of mixed origin, while the name of 'black pest' should be reserved for the Argentine form of spotted wilt. Black streak symptoms of tomato are fully described and the results of transmission experiments with the mixed virus given.

The negative results of inoculation experiments on cowpea are considered to exclude the tomato spotted-wilt virus as an agent of black streak.

The separation of the two viruses of black streak was effected by ten minutes' exposure of the juice from diseased tomato plants to a temperature of 80° C., which inactivates potato virus X but not the heat-resistant tobacco mosaic virus. All the mechanical transmission experiments with the latter on tomato, tobacco, and *N. glutinosa* were successful.

The potato virus X component was extracted by infecting *N. glutinosa* plants, in which the tobacco mosaic virus does not become established. This component was inoculated with uniformly positive results into tomato, tobacco, chilli, and *N. glutinosa*. The filterability, thermal inactivation points, and dilution limits of the two components support the hypothesis that one is tobacco mosaic virus and the other potato virus X.

Stoddard (E. M.). **Soil applications of oxyquinolin benzoate for the control of foliage wilting in Elms caused by Graphium ulmi.**—Abs. in *Phytopathology*, xxxvi, 8, p. 682, 1946.

Soil applications (10 gals. per tree in a single dose or five of 2 gals. on alternate days) of aqueous solutions of oxyquinolin benzoate at 0·1, 0·05, 0·025, and 0·0125 per cent. were made to groups of ten elm trees, 1·5 in. diameter at breast height, either 10 days before or 10 days after inoculation with *Graphium* [*Ceratostomella*] *ulmi* [*R.A.M.*, xxii, p. 504].

At 0·1 per cent. only 27·5 per cent. of the trees wilted as compared with 73·4 per cent. of the controls, the amount of wilting per tree also being less at this concentration than at any other, irrespective of mode or time of treatment. Plots receiving the single dose, however, at all concentrations showed more wilted trees but less wilting per tree than those treated with multiple doses. Treatment before or after inoculation made no difference. The isolation of the pathogen from an approximately equal number of trees from all plots, whether treated or not, suggests that oxyquinolin benzoate acted as an antidote to the fungus toxin causing the wilting and was not fungicidal in action.

Woodruff (J. B.). **Chestnut blight in Italy.**—*Trees*, vi, 4, pp. 8–9, 16, 1 fig., 1 map, 1946.

Grave concern is stated to have been caused in Italy by the fact that chestnut blight (*Endothia parasitica*) [cf. *R.A.M.*, xxii, p. 53] has now become established there and is steadily spreading. The first infection was observed in 1938 at Busalla, some 20 miles north of Genoa. Since then the disease has been found throughout the Province of Genoa and in the Region of Liguria, and two further infections have been discovered, one at Nola, near Naples, and the other at Tarcento, north of Udine, in north-eastern Italy. The attack at Busalla in 1938 affected approximately 200 trees over an area of about three acres, and, when found, the disease appeared to have been present for five to eight years. In 1946 only a few trees remained, and all were dead except for sprouts on the lower part of the trunks. The sprouts from the stumps of trees removed were severely cankered when only two or three years old. By 1942 one-half of the 190,000 acres of chestnuts in the Province of Genoa had become infected, and 'spot' infections had been noted in the adjoining Province of La Spezia and in the Region of Liguria. As a rule, trees 12 to 16 in. in diameter were dead or dying eight to ten years after infection had occurred.

Soon after the blight had been detected an effort to control it was made in Liguria. Landowners were ordered to cut out and destroy all infected parts of trees, the transport of wood of any species from one village to another was permitted only after official inspection, and the removal of any chestnut wood from the area of infection was prohibited. With the outbreak of war, however, it became very difficult to enforce these regulations. At present it is hoped that some degree of control may result from the development of resistant strains.

Walter (J. M.). **Canker stain of Planetrees.**—*Circ. U.S. Dep. Agric.* 742, 12 pp., 6 figs., 1946.

The available information on the canker stain of London plane (*Platanus acerifolia*) in the United States caused by *Endoconidiophora* sp. [*R.A.M.*, xxiv, p. 39] is summarized. The destructiveness of the disease may be gauged by the records of losses at Gloucester, New Jersey, one of the oldest centres of infection, where the mortality rate was 5·6 per cent. a year between 1940 and 1943, at the end of which 60 per cent. of the trees originally planted in the area were a total loss and a further 12 per cent. were infected. Of the 153,000 planes planted in Philadelphia, 10,000 are estimated to have succumbed to the disease; in 1940 the cost of removing a dead tree and replacing it by a young one was $35. Control measures should include pruning between 15th February and 1st December (in the latitudes of Philadelphia and New York); pruning tools should be disinfected with denatured alcohol before use on healthy trees, and climbing ropes can be decontaminated by three hours' exposure to formaldehyde vapour. The canker-stain fungus survives for lengthy periods in asphalt paint wound dressings, which should be replaced by a gilsonite varnish with the addition of 0·2 per cent. phenylmercuric nitrate.

MINKEVICIUS (A.). **Beitrag zur Verbreitung, wirtschaftlichen Bedeutung und zur Frage der Überwinterung von Cronartium ribicola Dietrich in Litauen.** [Contribution to the distribution and economic importance and to the problem of the overwintering of *Cronartium ribicola* Dietrich in Lithuania.]—*Phytopath. Z.*, xiv, 5, pp. 604–612, 1944. [Received August, 1946.]

In a preliminary study from 1935 to 1938 ten black currant bushes planted in a white pine (*Pinus strobus*) stand attacked by *Cronartium ribicola* [cf. *R.A.M.*, xvii, p. 281] contracted 71 to 100 per cent. infection in each of the four years. In similar plantings at a distance of 1 km. from the plantation, two bushes were rust-free in 1935 and nine in 1938; 1 to 30 per cent. infection developed on 4, 1, 5, and 1 in 1935, 1936, 1937, and 1938, respectively, 31 to 70 per cent. on 3, 1, and 1 in the first three years, and 71 to 100 per cent. on 1, 8, and 4, also excluding 1938. Elsewhere in the neighbourhood the numbers of bushes showing 1 to 30 per cent. infection in 1936, 1937, and 1938 were 1, 10, and 11, respectively, 31 to 70 per cent., 2, 6, and 6, and 71 to 100 per cent., 13, 2, and 4. Red currants, ordinarily very much less susceptible to the rust than the black varieties, also contracted the disease in a relatively mild form in the white pine planting, as also did the normally highly resistant gooseberry; on individual bushes the number of rusted leaves in the late summer ranged from 2 to 70 per cent.

Under Lithuanian conditions the perennation of the rust is effected solely by means of the teleutospores. The uredospores are responsible for its dissemination. Experiments in 1937 and 1938 showed the incubation period of these spores to be 10 to 12 days in the laboratory and 12 to 14 in the open, so that, even under weather conditions unfavourable for the pathogen, several generations can be produced in the course of a season. The only means of combating the currant rust, therefore, seems to lie in the confinement of white pines (pending the development of resistant forms) to experimental areas, more especially as a large proportion of the trees succumb to the disease. In the Kauen Botanical Garden, for instance, of 71 white pines planted in 1937, 17 had been killed by *C. ribicola* by 1944 and 37 were more or less severely infected.

ELLIS (D. E.). **Anthracnose of dwarf Mistletoe caused by a new species of Septogloeum.**—*J. Elisha Mitchell sci. Soc.*, lxii, 1, pp. 25–50, 3 pl., 1 fig., 5 graphs, 1 map, 1946.

In North America the dwarf mistletoes (*Arceuthobium* spp.) are highly important parasites of conifers. They cause widespread damage in western forests, coming next in importance to heart rots in point of losses produced, and they appear likely, unless more attention is paid to their control, to become much more injurious than fungi in cut-over forest areas. The best means of control at present known is to prune out infected branches repeatedly and remove severely affected trees from the stand, but this method is both arduous and expensive.

It has now, however, been found that *Arceuthobium* is attacked by a hitherto undescribed imperfect fungus which causes anthracnose and is responsible for the premature death of numerous shoots. The disease has been observed in six western states and it occurs naturally on seven of the eight forms of *A. campylopodum* and on *A. douglasii*. It attacks the stems primarily and occasionally the fruits, producing minute, yellowish-white spots which converge and break through the cuticularized epidermal layer, exposing large, white spore masses; pistillate plants are more often affected than staminate ones.

The fungus, which is named *Septogloeum gillii* n.sp., is characterized by the convergent character of the fruiting layer and hyaline, granular, cylindrical to fusiform, straight or slightly curved, continuous to triseptate conidia measuring

6·2 to 41 by 2·6 to 5·1μ, borne singly but in succession at the tips of the conidiophores, and accumulating in white, slimy masses, chalky and hard when dry. The simple or branched, continuous or septate, hyaline conidiophores measure 10 to 51 by 1·4 to 2·2μ.

In culture it grew well but very slowly on most of the usual agar media. It was isolated from five different host sources, and was differentiated into four strains which differed in rates of growth, colour (from a maize-yellow margin and Sanford's brown centre to a light mineral-grey margin and pale salmon or white centre), and type of growth (compact-velvety to radiating or with more aerial hyphae, and compact, woolly surface). The minimum, optimum, and maximum temperatures for growth in culture were, respectively, 1°, 17·5°, and slightly over 22·5° C., approximately.

Inoculation tests demonstrated that the fungus readily infects the host without the aid of wounds. It invades all the internal stem tissues except the vascular elements and develops a profuse intercellular mycelium. In some areas the disease appears greatly to reduce the reproduction and local spread of the host, but further work will be required to ascertain whether it can be used for biological control in new localities.

Bier (J. E.) & Foster (R. E.). **The relation of research in forest pathology to the preparation of forest inventories. 1. Suggested aids for cruising overmature stands of Sitka Spruce on the Queen Charlotte Islands.**—Reprinted from *B. C. Lumberm., April, 1946*, 4 pp., 3 graphs, 1 map, 1946.

In this first paper of a series dealing with forest disease prevention and control the authors state that an accurate inventory of a forest unit is the primary requirement for the management plan of the area. Inventories of forests which, like those in British Columbia, consist mostly of over-mature timber, are dependent in part upon a knowledge of the incidence, amount, and external indications of decay. During the past four years investigations into the forms of decay affecting Sitka spruce [*Picea sitchensis*] on the Queen Charlotte Islands showed that 31 different species of fungi can attack these trees and that, except in the case of conk rot (*Fomes pini*) [*R.A.M.*, xxv, p. 531] there are no reliable external indications of the different forms of decay. It is, however, possible in a given region to determine the amount of decay which occurs in a sufficient number of felled and bucked trees of all ages to serve as an example of the condition of the timber. The data presented are based on a detailed stem-analysis of 1,977 trees and are applicable only to Sitka spruce in this locality.

Fungal infection was not common in trees under 200 years of age. The percentage of diseased trees increased steadily after that with increasing age, and at 700 years all the trees were infected at some point in their merchantable length. Of the trees examined, 47 per cent. showed decay. The average decay volume was under 1 per cent. of the gross merchantable volume in trees up to 200 years old. After this, decay increased in the subsequent age classes, until in trees 750 years old 26·6 per cent. of the gross merchantable volume was destroyed. It was also found that decay was unimportant in trees 20 to 25 in. in diameter, but increased steadily until 24 per cent. of the gross merchantable volume was lost in the 100-in. diameter class.

In estimating the amount of decay likely to be present in the stands of these trees it should be possible to place the trees in broad age classes on a basis of their size and appearance; the factor for decay would then vary with the age classes in the stands. This method should give a more reliable estimate of current and future losses from decay than do methods which disregard the age factor. In any one region an adequate sample should be felled and analysed for decay, and the results applied to the remaining, uncut timber.

Scott (M. H.). **The use of chemically treated wooden poles for telephone and power transmission lines in South Africa.**—*J. S. Afr. For. Ass., 1946*, 13, pp. 21–34, 12 figs., 1946.

Experimental work on timber preservation has been in progress in South Africa since 1922, when a preserving plant was opened by the Forest Department, consisting of a steam-heated open tank, a high-pressure cylinder, and a small chemical laboratory. The original installation has been expanded from time to time to meet the requirements of commercial practice. The first telephone poles to be treated in the plant were put into service in 1924 and transmission poles in 1926, since when records have been kept of the condition of a very large number (pine and *Eucalyptus*) treated with a variety of preservatives and set up all over the Union under the most adverse conditions. The preparations tested fall into two main classes, namely, creosotes and other oily substances, and water-soluble salts, e.g., zinc chloride and arsenic, about 15 of the former and 50 of the latter category having been used. More recently pentachlorophenol and copper naphthenate preservatives have been tested, and both promise to assume increasing importance in wooden telephone and transmission pole line operations.

Details are given of the three common methods of creosote treatment in use at the plant, i.e., the open-tank and the full- and empty-cell pressure processes. A table is given showing the average life of treated and untreated poles, from which it appears that in South Africa creosote and metallic salts extend the duration of service from between two and seven to 20 to 30 and from 6 to 15 years, respectively.

From the outbreak of war up to 1944, the average annual supply of transmission and telephone poles by the State has been rather more than 7,000 and 26,000, respectively. At the time of writing an acute shortage of creosote in the Union has restricted the provision of poles to the most urgent undertakings.

Scott (M. H.). **Appropriate use of wood preservatives.**—*Fmg S. Afr.*, xxi, 244, pp. 479–482, 1 fig., 1946.

The classification and general properties are given of timber preservatives, based on 25 years' experimental work on over 100 different preparations tested under varied conditions of exposure to wood-destroying agencies. The main classes cited are creosotes, aqueous solutions, and organic solvents, both volatile and non-volatile [see preceding abstract]. The methods of application are briefly reviewed.

Björkman (E.). **Om lagringsröta i massavedgårdar och dess förbyggande.** [On storage rot in pulpwood yards and its prevention.]—*Medd. SkogsforskInst., Stockh.*, xxxv, 1, 174 pp., 47 figs., 1 diag., 26 graphs, 1946. [English summary.]

Stereum sanguinolentum was the most prevalent agent of the serious decay developing in pine and spruce pulpwood in the north of Sweden during the war period of 1940 to 1945, when work in the yards was virtually at a standstill and large quantities of material had to be stored in a limited space. It developed during the first summer after felling, while other early invaders were *Polyporus* [*Polystictus*] *abietinus* and its variant *Irpex fuscoviolaceus* [*R.A.M.*, xxv, p. 525] and *Corticium evolvens* [ibid., xvi, p. 7]; the last-named was particularly common in birch wood, which was further disorganized by *S. purpureum*, *S. hirsutum*, and *Polyporus zonatus*. More destructive than these early-rot fungi, which are primarily lignin-consumers, are the cellulose-decomposing species [ibid., vi, p. 68] developing at a later stage in inadequately dried coniferous wood, including *Poria vaporaria* [ibid., xxiv, p. 300], *Trametes serialis*, *T.* [*Lenzites*] *trabea*, and *L. sepiaria*.

Damage from wood-rotting fungi was always more extensive in wood with the bark left intact or only partially removed than in completely decorticated material,

and specially favourable conditions were provided by the humid atmosphere prevailing at the bottom of the piles; however, in very closely packed piles the excessively high moisture content of the lower layers precluded the development of the organisms, which consequently migrated to the middle of the stack. The microclimate in pulpwood piles varies considerably with the height and spacing of the piles and also with the degree of drying. Generally speaking, the humidity inside and between the piles greatly exceeds that of the open air, reaching 90 to 100 per cent. in the former location during the summer compared with 40 per cent. in the latter. The temperature, on the other hand, is considerably lower in the interior of the stacks than outside them; for instance, it did not rise above 10° C. between two piles in July, remaining constant day and night irrespective of external fluctuations.

The importance of storage rots in the manufacture of sulphite and sulphate pulps was investigated in about 100 boilings of pine and spruce wood stored for varying periods and attacked by different fungi. *S. sanguinolentum* was shown to reduce the yield by 1 to 3, 10, and 15 to 20 per cent. in one, two, and three years, respectively, of defective storage, while the above-mentioned cellulose-destroying organisms were responsible for still heavier losses, *L. trabea*, *T. serialis*, and *Polystictus abietinus*, for example, causing losses of 21, 16, and 28 per cent., respectively, the two first-named within two years and the third in four. Fungal decay also diminishes the strength of the pulp, especially sulphite, *S. sanguinolentum* causing a decrease of 5 to 10 per cent. in two years, while the cellulose-destroyers are a source of correspondingly greater damage. The darkening of the pulp consequent on storage rot, even after only a year of infection by *S. sanguinolentum*, may entail de-grading from the first to the second class. Blue stain, due mostly to *Pullularia pullulans* [ibid., xxv, p. 241], results in a greyish pulp, but this defect appears to be significant only in the case of sulphite.

In laboratory experiments under controlled conditions the wood-rotting fungi usually developed most rapidly in a moisture-saturated atmosphere [cf. ibid., xviii, p. 360]. A decrease in the relative humidity to 95 per cent. considerably impaired the activity of the fungi, at 90 per cent. (fibre-saturation point), corresponding to 24 per cent. water content of the wood, their growth was largely inhibited, and at 85 per cent. relative humidity (20 per cent. water content), they were unable to cause any damage. Similarly, at a very high water content, approaching saturation of the wood, there was a marked falling off in fungal activity, though some of the organisms could develop fairly well in the portion of the wood above water-level, e.g., *Coniophora puteana*, *Merulius lacrymans*, *Poria vaporaria*, *T. serialis*, *L. trabea*, *Polyporus ferrugineo-fuscus*, and *Lentinus lepideus*, while several proved capable of continued growth in infected wood even under immersion, including *P. ferrugineo-fuscus*, *Poria vaporaria*, and *L. lepideus*. None of the fungi, however, could invade sound water-saturated wood above or below water-level: a saturation degree of 70 per cent., corresponding to a water content of 120 per cent., generally sufficed to exclude them. The optimum degree of saturation for most of the species under investigation lay between 20 and 50 per cent., representing 35 to 85 per cent. water content of pine wood. The early-rot fungi throve at the lower values of the humidity range, while most of the later invaders were more active at the higher ones. The production of fruit bodies is often stimulated by a comparatively dry atmosphere (95 to 98 per cent. relative humidity), and thus the appearance of these organs and surface mycelium is not necessarily an index of extensive disorganization of the wood. With a few exceptions, however, such as *C. evolvens*, fruit body formation does connote an advanced stage of decay.

The optimum temperature for most of the fungi was about 25°, though their requirements varied to some extent, *S. sanguinolentum* and *M. lacrymans* developing best at 20° and *Lenzites sepiaria* and *L. trabea* at 30°. The growth and

wood-destroying activities of the late-rot group were inhibited at 5° [cf. ibid., xix, p. 56], but the early agents of decay made some progress at the low temperature: this ability to withstand cold promotes vegetative development and assists in the rapid spread of the organisms.

Practical recommendations for the control of storage rot, based on the foregoing observations, include the following. In upper Norrland it is safe to store pulpwood in calm water over one summer and autumn without serious risk of decay, but under the warmer conditions prevailing farther south this practice is inadvisable. For land storage the wood should be completely decorticated and stacked in well-ventilated piles, resting on specially constructed foundations of dry pine logs and thick fuel wood above ground-level to ensure drainage and the replacement of the cold, heavy air in the lower layers by dry air. High piles of floated timber should be separated by a space of at least 3 m. One-row piles, i.e., of the breadth of one log, are preferable to those of two rows with overlapping ends. Wood yards should be situated on hard, sloping ground and the piles laid in the direction of the prevailing winds, the intervening spaces being cleared of fallen logs and superfluous vegetation to reduce the moisture content of the air. The best drying season, April to June, should be utilized for the lower parts of the piles (a height of 5 to 7 m.), the upper layers being added in the late summer to dry during the following spring; alternatively the piles may be built up to half their height in the autumn and completed immediately after drying in the spring, when they will be ready for manufacture the next autumn.

Löhnis (Marie P.). **Weefselwoekering door voedselstoring.** [Tissue proliferation from nutritional disturbance.]—*Tijdschr. PlZiekt.*, xlvii, 4, pp. 149–153, 1941. [Received November, 1946.]

In the course of studies on the reaction of swedes to boron deficiency in water cultures the author examined roots measuring 8 cm. across showing, besides a well-marked discoloration of the medulla, a distinct brown ring representing the rudiments of the cambial layer, which are macroscopically invisible in healthy material. Under the microscope the affected tissues are seen to be abnormally expanded and composed of very irregularly shaped cells; there is no sign of longitudinal extension. The differentiation of the meristematic cells into phloem and xylem is inhibited and replaced by a tissue of cells of which the shape seems to be determined by external pressure. A comparable picture is presented by the cork cambium of field swedes suffering from 'brown heart' in Holland [*R.A.M.*, xvii, p. 432; xviii, p. 153; xxii, p. 320].

The mechanism of the chemical processes underlying the phenomenon, which appears to be common to all plants liable to 'brown heart', is briefly discussed.

Newton (W.) & Bosher (J. E.). **The longevity of Phoma betae in garden Beet.**—*Sci. Agric.*, xxvi, 7, pp. 305–306, 1946.

As part of an investigation undertaken with a view to preventing the introduction of seed-borne plant diseases into recently established seed-production areas in British Columbia, an inquiry into the viability of *Phoma betae* in seed of the Detroit Dark Red variety of garden beet was made. In 1940 B.C. Certified seed from the North Okanagan district of the Province showed a high percentage of *P. betae* infection. Each year from 1940 to 1945, one or more samples of 100 clusters were sown, equally spaced, in flats of autoclaved soil. The results showed a decrease in seedling mortality due to the pathogen with the increasing age of the seed, so that by 1945 only 2 per cent. loss amongst 158 seedlings was recorded, as against 33 amongst 121 in 1940, cluster germination being 80 per cent. in the latter year and 94 in 1945. At the same time, *P. betae* infection is rarely of sufficient economic importance to necessitate a five-year seed-storage period as a control

measure. The slight increase in germination shown after five years' storage may be important, but the factors which may affect germination are so many that the increase is not inferred to be due to the decline in the amount of fungal infection.

Hare (W. W.) & Walker (J. C.). **Ascochyta diseases of canning Pea.**—*Res. Bull. Wis. agric. Exp. Sta.* 150, 31 pp., 7 figs., 1 graph, 1944.

Of the three *Ascochyta* diseases of pea, *A. pinodella*, *A. pisi*, and *Mycosphaerella pinodes*, the last-named is by far the most important under Wisconsin conditions [*R.A.M.*, xxii, p. 285; xxvi, p. 1]. It is the most frequently encountered and exhibits greater virulence than the others. Full descriptions of the life-history of *M. pinodes* and the blight it causes on the pea plant are given, with comparative accounts of the other organisms. *M. pinodes* was shown to overwinter on the pea straw, producing pycnidia in the middle of May and mature perithecia in early June. Both types of spore are disseminated only in moist weather but only the ascospores are wind-dispersed, and they may travel distances up to $\frac{1}{4}$ mile.

M. pinodes was found to be homothallic and to have an optimum temperature for growth between 20° and 28° C. Light exerted a stimulating effect on pycnidial production which was best secured at 16° on potato dextrose agar. Differences in cultural characters of the three species, their rate of growth, and rate of spore germination, were recorded. Ascospores of *M. pinodes*, produced on potato-dextrose agar and diseased leaves, averaged 7·9 by 17·2μ, while the pycnospores averaged 4·5 by 12·3μ, as against 3·7 by 8·0μ for *A. pinodella*, and 4·2 by 13·9μ for *A. pisi*. All three species caused a foot-rot presenting identical symptoms, the degree of virulence being in the descending order *A. pinodella*, *M. pinodes*, and *A. pisi*. On the aerial parts of the host *M. pinodes* and *A. pinodella* could not be differentiated macroscopically; all three species penetrate the host directly, rather than through the stomata. In greenhouse inoculations, the incubation period for *M. pinodes* and *A. pinodella* was from two to three and for *A. pisi* four to five days. In experiments with Wisconsin Perfection, Profusion, and Prince of Wales peas it was found that plants of the same variety may exhibit different degrees of tolerance to each of the three species, quite small plants being more tolerant under greenhouse conditions than larger ones. Slight differences in susceptibility to *M. pinodes* and *A. pisi* were noted in the greenhouse investigations, but none to the former in the field. Although early varieties were severely attacked by *M. pinodes* when late ones appeared quite tolerant, the symptoms of the latter group gradually increased in severity, and when all varieties were compared at their respective canning stages they were equally diseased. Since no varieties showing practical tolerance of *Ascochyta* diseases have been found, the best methods of control appear to lie in the use of disease-free seed, rotation, sanitation, and the separation of plantings of different maturity dates.

Koopman (C.). **De bestrijding der vetvlekkenziekte.** [The control of the grease spot disease.]—*Tijdschr. PlZiekt.*, l, 3, pp. 62–68, 1944. [Received November, 1946.]

After a brief discussion of the difficulties of combating the bean (*Phaseolus vulgaris*) grease spot disease (*Pseudomonas medicaginis* var. *phaseolicola*) in Holland [*R.A.M.*, xxv, p. 90] by the cultivation of resistant varieties or seed selection, the writer reports promising results from several applications to the growing crop of 0·5 or 1 per cent. Bordeaux mixture, as recommended by Hähne in Germany [ibid., xxi, p. 512], preceded by the elimination of any sickly plants shortly after emergence. For breeding purposes, necessitating absolute purity of the seed, selection must still be practised, but the work is too laborious and time-consuming for large-scale operations. The grease spots are more easily discernible on the pods

than on the seed. Varieties susceptible to grease spot should be sown relatively late, i.e., not before 10th May for marketing and about the 15th for seed.

HEDGES (FLORENCE). **Association of Xanthomonas phaseoli and the common Bean-mosaic virus, Marmor phaseoli. II. Dissociation studies of X. phaseoli.**—*Phytopathology*, xxxvi, 8, pp. 589–612, 6 figs., 1946.

These studies of *Xanthomonas phaseoli* were undertaken to discover whether any changes in the bacterium had occurred during its two years' association with bean-mosaic virus *in vivo* [*R.A.M.*, xxiv, p. 47], which might explain its decrease in virulence and failure to maintain continuously its 'typical' form in the host tissues; and to determine whether a filterable form of *X. phaseoli*, capable of producing mosaic, existed.

Using Quirk's technique and special media [ibid., xi, p. 226, and *J. Bact.*, xliv, p. 148, 1942], dissociated cultures of a normal, virulent, S [smooth] yellow strain having no association with mosaic virus, and the 'typical' virulent, S yellow strain P(M+P)^{34} were found to exhibit striking differences. This latter strain had been associated continuously for two years *in vivo* with bean-mosaic virus, and was isolated from the 34th serial passage of infected juice from bean plant to bean plant, that is, shortly before the disappearance of all bacterial symptoms from the inoculated plants which took place during the 36th serial passage, and before the sudden outbreak of ultra-severe mosaic in the 38th [loc. cit.].

The strain P(M+P)^{34} dissociated into mildly infectious, opaque-white R to S (varying from rough to smooth) and non-pathogenic, S pink variants which quickly outgrew the 'typical' virulent, S yellow form. The dissociated normal strain, however, produced the R to S white variant only after leaching and it was quickly overrun by the S yellow, while the S pink variant appeared only after filtering. These results were demonstrated far better on Quirk's than on the common bacterial media. Filtrates of each strain transferred to nine such media resulted in growth on two only. In all subcultures from these two the R to S white variant was dominant.

Transfers from the scarcely visible, hyaline, finely roughened, pellicle-like colonies, produced from the filtrates of each strain, gave on medium iv an initial S growth of the R to S white variant followed by the S yellow form in the case of the normal strain and by the S greenish-yellow with P(M+P)^{34}. An S pink variant, occurring in the form of superimposed colonies, streaks, or sectors, and far more conspicuous in the P(M+P)^{34} strain, appeared in second or third lineal transfers from the bacterial suspension in the filter tube in each strain. The 'typical' virulent S yellow form was recovered from the filtrate of each strain when transfers to Thaxter's potato dextrose agar were made from the filter tube after 10 days' incubation. Patches of S growth of the R to S white variant appeared in the case of P(M+P)^{34}.

All the dissociated cultures of each strain, including filtrates, showed some virulence in inoculation tests with Stringless Green Refugee seedlings, the severity of bacterial infection being directly proportional to the amount of the S yellow form in the inoculum. When the R to S white variant was dominant infection was poor or only moderate, rarely visible on the inoculated leaves, and more often than not only discernible by microscopic examination of the stem. The R to S white variant from the normal strain filtrate reverted to typical S yellow in the host within 10 days after inoculation. Some mosaic symptoms were induced by inoculations with filtrates of each strain, but it is considered that further work is necessary before it is proved that filtrates of *X. phaseoli* cultures can produce mosaic. The decrease in toxicity of *X. phaseoli* during its two years' association *in vivo* with bean-mosaic virus is considered to be due to the increased development of the weakly pathogenic R to S white and non-pathogenic S pink variants, which

resulted in the partial subordination of the virulent S yellow form of the bacterium.

The author believes that properties of virulence, mild virulence, and avirulence are inherent in all so-called 'typical' cultures of *X. phaseoli*, and the dominance of one or another may be determined by a number of factors both *in vitro* and *in vivo*. It is probable that an associated infective agent, if present, may play, either directly or indirectly, an important rôle.

Hedges (Florence) & Fisher (H.). **Association of Xanthomonas phaseoli and the common Bean-mosaic virus, Marmor phaseoli. III. The effect of varying amounts of nitrogen on pathogenicity.**—*Phytopathology*, xxxvi, 8, pp. 613–623, 1 fig., 1946.

The present investigation was undertaken to examine the effect of supplying varying amounts of nitrogen to bean plants infected with the disease complex, and the separate infective agents, *Xanthomonas phaseoli* and bean mosaic virus [cf. *R.A.M.*, xxi, pp. 169, 228, and preceding abstract]. Stringless Green Refugee Bean seedlings grown in sterilized, washed quartz sand were inoculated with (*a*) juice from the serial passages of bean juice containing both the bacterium and the virus, or (*b*) pure, single-colony cultures of *X. phaseoli* growing on steamed potato cylinders, or (*c*) juice containing the virus from serial passages of bean juice. Nutrient solutions made according to Spencer's formula (*Phytopathology*, xi, p. 770, 1921) and containing 9·8, 200, and 2,000 p.p.m. nitrogen, respectively, were supplied to the plants. For comparison, similar inoculations were made on plants growing in sterilized composted soil and non-inoculated plants were grown in both media.

The most virulent development of both virus and bacterium occurred with 200 p.p.m. of nitrogen in the medium. This was also the optimum for growth of the host, which developed root nodules in spite of the sterilization of the media. Pathogenicity tests with juice from all sets of plants inoculated with the disease complex (using juice $(M+P)^{57}$ from the 57th serial passage of bean juice containing the virus and 'typical' *X. phaseoli*) showed that the virus had not been inhibited by any of the three nitrogen concentrations, since the juice produced 100 per cent. good mosaic when tested on plants grown in composted soil. There was, however, a marked inhibition of the bacterium both by low and high nitrogen. When, however, isolates of the bacterium from the same three nitrogen sets were first grown on steamed potato cylinders and then used as inoculum, all were very virulent, although that from the medium nitrogen was markedly more so.

Some doubt is expressed as to the freedom of the pure virus from contamination with masked *X. phaseoli*.

Baker (K. F.), Snyder (W. C.), & Holland (A. H.). **Lygus bug injury of Lima Bean in California.**—*Phytopathology*, xxxvi, 7, pp. 493–503, 2 figs., 1946.

Large and baby Lima beans [*Phaseolus lunatus*] and Blackeye cowpeas in California are liable to a necrotic pitting of the seed closely resembling that associated with yeast spot (*Nematospora coryli*) [*R.A.M.*, v, p. 202; xxiii, p. 207]. Field and greenhouse tests with the bugs *Lygus hesperus*, *L. elisus*, and possibly other species caged on Lima beans showed that the pits are caused by the toxic feeding of the insects on the developing reproductive organs. Injury from the bugs cannot be differentiated from yeast spot on the basis of symptoms alone.

Warington (Katherine). **Molybdenum as a factor in the nutrition of Lettuce.**—*Ann. appl. Biol.*, xxxiii, 3, pp. 249–254, 1 pl., 1 graph, 1946.

Further experiments [*R.A.M.*, xxi, p. 317] on the effect of molybdenum (at 0·1 p.p.m. as sodium molybdate) on the growth of lettuce in nutrient solutions

have confirmed the beneficial effects resulting. As, however, this is not invariably so it is considered that some other factor, not yet discovered, is operating as well.

Le Beau (F. J.). **Fermate does control Cucumber anthracnose.**—*Food Packer*, xxvii, 8, pp. 67–68, 2 figs., 1 graph, 1946.

Two years' tests in Louisiana demonstrated the superiority of 10 per cent. fermate dust over Bordeaux mixture, tribasic copper sulphate, yellow cuprocide, and dithane in the control of cucumber anthracnose (*Colletotrichum lagenarium*).

Levadoux (L.). **Chronique du court-noué.** [A note on court-noué.]—*Progr. agric. vitic.*, cxxvi, 35–37, pp. 124–126, 1946.

The author cites a communication from a local grower stating that at Domerat (Allier), France, court-noué of the vine [*R.A.M.*, xxvi, p. 6] first appeared between 1930 and 1932, on the hybrid Seibel 4643. This variety was affected in all localities except those where the soil was extremely permeable. Fifteen years' observations have shown that Seibel 4643 has become affected (locally) wherever its roots have remained in water during the rainy season, the vines round such wet spots being unaffected. While the grower thought that the dry (and unaffected) areas were those which might be expected to favour *Phylloxera* [*vastatrix*], the author points out that the reverse is the case, the dry spots consisting of pure, rough sand which the insects avoid, while the wet spots are highly favourable to them, being more compact.

Further evidence by the grower supported the view that the less frequently a vineyard has been replanted since it was first reconstituted on American roots the less prevalent is court-noué. Vines grafted on plants resistant to *P. vastatrix* naturally remain unaffected longer than ungrafted vines whose resistance, particularly that of Seibel 4643, is very mediocre. The grower also pointed out that grafted vines planted in new soil have so far remained unaffected, as have vines grafted when under 20 years old in all soils.

The author concludes that the disease was introduced locally on Seibel 4643 cuttings and that it rapidly spread in places harbouring *P. vastatrix*, which are also those with the highest amounts of potassium.

Escafit (H.). **Mildiou. Une zone de foyers primaires, Laurens (Hérault).** [Mildew. An area of primary foci of infection, Laurens (Hérault).]—*Progr. agric. vitic.*, cxxvi, 35–37, pp. 134–137, 1946.

The author adduces reasons for the view that a permanent centre of primary infection by vine mildew [*Plasmopara viticola*] exists at Laurens, Hérault, where every year the first symptoms appear before they are present anywhere else in Languedoc. That the district does not suffer more severely from the disease than other areas in this part of France is attributed to the fact that intense drought prevails locally every June and arrests secondary infections.

Bosc (M.). **Sur la structure des noyaux et la méiose de Plasmopara viticola (Berk. et Curt.) Berl. et de Toni.** [On the nuclear structure and meiosis of *Plasmopara viticola* (Berk. & Curt.) Berl. & de Toni.]—*C. R. Acad. Sci., Paris*, ccxxiii, 16, pp. 584–586, 1946.

The study of fixed and stained material of *Plasmopara viticola* revealed a vegetative nucleus about 2μ in diameter, surrounded by a membrane which is retained throughout the process of division. When at rest it presents a central or subcentral karyosome, staining violet-blue with the reagent of Turchini *et al.* (*Montpellier méd.*, xxiii–xxiv, p. 599, 1943), an index of abundant thymonucleic acid. The several phases of mitosis of the vegetative nucleus are briefly traced. The antheridia, developing towards the end of the season, result from the terminal

extension of the mycelium and are clavate, measuring 40 to 50 by 20 to 25μ. The oogonia, originating in the same way, are roughly spherical and of an average diameter of 30μ. A nucleus of the antheridium fuses with one from the oogonium, the diameter of each being twice to 2½ times that of the other nuclei. The nuclear membrane at the point of contact between the two nuclei disappears and the karyosomes unite. The oospore remains in this stage until the spring. At the quadrinuclear phase in the mitosis of the reproductive nucleus it was possible to discern 14 to 16 chromosomes, i.e., about double the number contained in the vegetative nucleus.

From these data it is concluded that the nuclei of the mycelium and conidia are haploid, while those of the oospore and of the early stages of division of the reproductive nucleus are diploid. Chromatic reduction, therefore, would not occur at the first division of the reproductive nucleus, as assumed by Arens [*R.A.M.*, ix, p. 59], but at the phase of 8 to 16 nuclei. Moreover, the nuclei of the ephemeral diploid generation undergo normal karyokinesis, in contrast to the promitotic type of the vegetative nuclei. This structural difference between the haploid and diploid nuclei is believed to be here reported for the first time.

Mulder (D.). **Afsterving van Kasdruiven door Phomopsis spec.** [Die-back of hothouse Grapes caused by *Phomopsis* sp.]—*Tijdschr. PlZiekt.*, xlvii, 3, pp. 120–129, 2 pls., 1941. [English summary. Received November, 1946.]

The pycnospores of the species of *Phomopsis* isolated from Gros Colman vine stems affected in Dutch hothouses by a disease resembling the 'dead arm' (*Cryptosporella viticola*) of the United States [*R.A.M.*, xvi, p. 299; xxiv, p. 3] measure 5·7 to 7·4 by 1·8 to 2·3μ, and those from the Alicante and Frankenthaler varieties 6·9 to 1·8μ. The relationship, if any, between the *P.* sp. of Holland, the *P.* sp. isolated from vine by Goidànich in Italy [ibid., xvii, p. 288], and *C. viticola* has not yet been investigated. The symptoms of the Dutch disease include a partial wilt and die-back and the presence on the stems of the 'longitudinal ribbed excrescences' described by Reddick. The *Phomopsis* probably enters the vines through pruning wounds inflicted with a contaminated knife, the mycelium presumably providing the bulk of the inoculum since pycnospores are only scantily produced in Holland. Tumours caused by *Bacterium tumefaciens* and a *Sphaeropsis* sp. are sometimes associated with the die-back.

Hopkins (J. C. [F.]). **Two diseases recorded for the first time in Southern Rhodesia.** —*Int. Bull. Pl. Prot.*, xx, 9–10, p. 80M, 1946.

Potato late blight (*Phytophthora infestans*) and tobacco Granville wilt (*Xanthomonas solanacearum*) are reported for the first time from Southern Rhodesia. The former caused no serious loss, and the latter is confined to two closely situated farms.

Hopkins (J. C. [F.]). **Annual Report of the Branch of Plant Pathology and Botany for the year ending 31st December, 1945.**—*Rhod. agric. J.*, xliii, 4, pp. 333–343, 2 figs., 1946.

In this report on plant disease work in Southern Rhodesia in 1945 [cf. *R.A.M.*, xx, p. 448] it is stated that the most important record of the year was the discovery of *Phytophthora infestans* [see preceding abstract] on potatoes in the Salisbury district, the diagnosis being confirmed by the Imperial Mycological Institute. Other new records include *Zinnia* leaf spot (*Cercospora zinniae*) [ibid., xxiv, p. 388], apple bark canker (*Myxosporium corticola*) [ibid., xvii, p. 586; xxiii, p. 476], grapefruit smoky blotch (*Stomiopeltis citri*) [ibid., xiii, p. 693], and leaf spot of *Nicotiana alata* var. *grandiflora* (*Alternaria longipes*).

Waterston (J. M.). **Report of the Plant Pathologist, 1945.**—Department of Agriculture, Bermuda, 12 pp., 1946.

Among other items of phytopathological interest contained in this report [cf. *R.A.M.*, xxiv, p. 306], it is noted that the spread of *Xanthomonas campestris* on cabbage and cauliflower [ibid., xxiii, p. 5], favoured by heavy autumn rainfall, caused heavy loss. On 27th October, 1945, a fine fructification of *Polyporus graminicola* was observed at the Agricultural Station on dead bamboo (*Dendrocalamus strictus*), constituting a new substrate record. *Phytophthora parasitica* was early reported on St. David's Island on the Howardii variety of Easter lily (*Lilium longiflorum* var. *eximium*) causing losses of 27 to 50 per cent. in some fields. It was spread by heavy rain washing soil into the emerging shoots, and highest incidence occurred in plants growing along the edges of paths where surface water tended to run off and collect. Spraying with Bordeaux provided effective control. *Rhizoctonia* [*Corticium*] *solani* was observed on tomato seedlings at the Agricultural Station on 7th November, 1945, apparently a new host record for Bermuda.

Department of Plant Pathology.—*Rep. Del. agric. Exp. Sta., 1944–5* (*Bull.* 259), pp. 33–39, 1945.

The following are among the items of phytopathological interest in this report [cf. *R.A.M.*, xix, p. 388]. One hundred selected strawberry seedlings, grown in 1943 from the resistant varieties Aberdeen and Pathfinder, were tested by T. F. Manns during 1945 for resistance to red stele [red core (*Phytophthora fragariae*): ibid., xxiv, p. 325] and for commercial value. Several thousand progeny from two seedlings, Aberdeen D9A and D207A, were set out for limited trials in 1945, the former strain having shown great resistance to frost injury.

In experiments by J. W. Heuberger on the control of soy-bean diseases dithane, applied as a soil treatment at 100 lb. per acre at planting time, severely damaged the seed. The practice in Delaware of growing Lima beans [*Phaseolus lunatus*] after peas in the same year has been found to entail some risk of damping-off and root-rot troubles. Spergon and arasan proved equally effective for controlling Lima bean seedling diseases, but significant increases of stand from such treatments occurred only in tests on land previously cropped with peas in the same year. Spergon was also the best seed treatment for peas and soy-beans [ibid., xxv, p. 379].

J. W. Heuberger and T. F. Manns record that in 1943 dithane plus zinc sulphate-lime excelled other fungicides in the control of early blight of late red potatoes [*Alternaria solani*: ibid., xxiv, p. 69; xxv, p. 415], promoted the most vigorous top growth, and gave the maximum yield, significantly higher than Bordeaux mixture. Dithane used alone gave poor results. Zinc sulphate added to copper compound A conferred similar protection.

Field tests conducted by J. W. Heuberger on tomato and potato showed that zerlate was a significantly better fungicide than any of the other dimethyl dithiocarbamates for the control of early blight. It was also the best for controlling anthracnose [*Colletotrichum phomoides*: ibid., xxvi, p. 36] on tomatoes, and equal to Bordeaux mixture in combating *A. solani* on potatoes and tomatoes. The position of the salt in the electromotive series was found to condition the effect on the fungicidal power of adding zinc sulphate-lime to metallic dimethyl dithiocarbamates (zinc salt excepted), those above zinc being most affected and those below least. Thus, increased control was recorded for the calcium, sodium, and iron salts, but not for those of copper and lead. The copper salt was the only one causing injury, which was severe in both tomato and potato. The above advantages of zerlate, and the fact that it controls leafhopper injury on potatoes better than Bordeaux mixture, suggests that it may replace copper fungicides now in use.

Compounds [U.S.R.] 604 and A03 were promising as foliage sprays for controlling early blight on tomato and potato, and anthracnose on tomato, being superior to standard fixed copper materials.

The entirely satisfactory control of damping-off of peas by dithane and by calcium dimethyl dithiocarbamate has led to further investigation of their use as soil treatments for controlling seed-borne diseases.

S. L. Hopperstead, T. F. Manns, and J. W. Heuberger showed that for the control of apple scab [*Venturia inaequalis*] and brown rot of peaches [*Sclerotinia fructicola*] puratized N5–X [ibid., xxiv, p. 138], used at 1 to 1,000 (1 to 8,600 active ingredient) and 1 to 2,000 (1 to 17,200), was slightly superior to standard-strength lime-sulphur. Isothan Q15 [ibid., xxiv, p. 443] at 1 to 1,000 (1 to 5,000 active ingredient) and fermate at ½ lb. plus half-strength micronized sulphur were equal to the standard wettable sulphurs.

Compound 604 at 1 lb. to 100 gals. controlled apple scab on the Delicious and Rome varieties, but severe fruit injury resulted from heavy residues. Dithane at 0·45 to 1·8 lb. alone or with zinc sulphate-lime proved unsatisfactory against scab and alone caused foliage injury.

In initial tests on peaches isothan Q15 provided safe and thorough control of brown rot. Puratized N5–X did damage and fermate, while adequate in control, left objectionable colour residues.

Fawcett (G. L.). **Departamento de Botánica y Fitopatología.** *Ex* **Memoria anual del año 1944.** [Department of Botany and Phytopathology. *Ex* Annual Report for the year 1944.]—*Rev. industr. agríc. Tucumán*, xxxvi, 1–3, pp. 57–60, 1 fig., 1946.

The extensive investigations on sugar-cane smut (*Ustilago scitaminea*) carried out during the period covered by this report [cf. *R.A.M.*, xxv, p. 28] have been described in part in a bulletin of the Tucumán Agricultural Experiment Station [ibid., xxiv, p. 73].

An unthrifty condition of oranges signalized by foliar stunting is attributed to an excess of sodium chloride in the irrigation water. Normal new growth was made by affected plants transferred to non-irrigated sites.

During 1943–4 potato plants for the first time developed a marked necrosis of the upper stem region, the juice of which, inoculated into tobacco, induced the typical symptoms of 'corcova' [tomato spotted wilt virus]. Another potato disease, possibly of virus origin, caused elongation of the stem, drooping of the plants to a level with the ground, chlorosis of the apical leaves, and a poor crop of under-sized tubers.

Alibert (H.). **Une nouvelle maladie, le swollen-shoot. Les Cacaoyers d'Afrique en péril.** [A new disease, swollen shoot. The African Cacao plantations threatened.]—*Atomes, 1946*, 6, pp. 23–26, 6 figs., 1 map, 1946.

This is a summary of the available information on cacao swollen shoot, with special reference to its extension from the Gold Coast to the Ivory Coast and the two main forms assumed by the virus in the latter territory [*R.A.M.*, xxv, p. 549].

Cheesman (E. E.). **Interim report on Cacao research 1944–45. Results of Cacao experiments in 1944–45.**—*Trop. Agriculture, Trin.*, xxiii, 4, pp. 63–65, 1946.

In field trials in Trinidad the standard cacao clone ICS 1 has proved to be the most generally satisfactory of all those tested. It is susceptible to witches' broom [*Marasmius perniciosus*: *R.A.M.*, xxv, p. 296], as are all the Trinidad selections, but within the range of variation shown in this respect by the ICS series it ranks as relatively resistant. ICS 6 possesses the advantage of losing only a small percentage of its pods through *M. perniciosus* (even less than ICS 1), but it shows more virus infection [ibid., xxvi, p. 48] than any other clone in CRB 1. ICS 8

produces more pods than ICS 1 but loses more than twice as many from witches' broom; in spite of this, it is a first-class clone suitable for commercial planting wherever incidence of the disease is not heavy. ICS 45 (Criollo) shows very small loss of pods and is of great promise. ICS 60 shows a high rate of cushion infection by witches' broom, but pod loss is not unduly high, and the clone is well worth commercial trial.

STAKMAN (E. C.). **Plant pathologist's merry-go-round. A survey of the never-ending battle against plant diseases.**—*J. Hered.*, xxxvii, 9, pp. 259–265, 1 pl., 4 figs., 1946.

In this condensed report of a lecture delivered to the Society of Sigma Xi of the United States, the author briefly reviews the fluctuating importance of wheat diseases in response to changes in cultivation, climate, host varieties, and fungus strains. The resistance-susceptibility scale used in grading the virulence and detecting the distribution of physiologic races of the wheat stem rust fungus (*Puccinia graminis tritici*), the hybridization of maize smut [*Ustilago maydis*] races, and variations in virulence of mutants of *Helminthosporium sativum* are described to illustrate the complex and unending problems which confront plant pathologists.

BUTLER (F. C.). **Stem rust of Wheat.**—*Agric. Gaz. N.S.W.*, lvii, 9, pp. 483–487, 4 figs., 1946.

Throughout the wheat belt proper of New South Wales, stem [black] rust of wheat (*Puccinia graminis tritici*) is of considerably more importance than leaf [brown] rust [*P. triticina*] in the reduction of yields, but in the coastal areas, where the crop is grown for fodder, the position is reversed. In 1916 the losses from black rust in the State were computed at £2,000,000, while the average annual loss over the 20-year period from 1918 to 1938, during which particularly heavy tolls were taken in 1920, 1925, 1930, and 1934, was estimated at £250,000. Further severe outbreaks occurred in 1939 and 1942.

Fallowing and superphosphate soil amendments, which tend to accelerate maturity, may sometimes obviate serious damage from rust infection. The growing crop should not be irrigated, since this practice assists in the spread of the pathogen: it is preferable to flood the land first, and then conserve moisture by cultivation. Rust-resistant varieties available for distribution to farmers include Celebration, Charter, Cabo, Kendee, and Yalta.

MARCHIONATTO (J. B.). **Factors which lowered the Argentine Wheat yield in 1945.**—*Int. Bull. Pl. Prot.*, xx, 9–10, p. 81M, 1946.

During 1945 the wheat yield in Argentina was lowered by several factors of a climatic or parasitic nature, particularly drought. Delayed growth was particularly marked in the early varieties, such as Sinvalocho M.A. and 38 M.A. [*R.A.M.*, xxi, p. 187], which eared late and were exposed to a greater extent than others to infection by *Puccinia graminis* and *Fusarium graminearum* [*Gibberella zeae*]. At the start of spring and before the rains in the Pergamino area, the wheat, then in the milky stage, assumed the 'arrebatado' aspect characterized by the formation of large tufts of mature plants with white ears. The phenomenon gradually became general and the wheat showed premature maturity. At the same time, a preliminary attack of *G. zeae* took place; this occurs every year during earing. The environmental conditions favoured fungal attack first at the foot, then in the roots. This form of infection, virtually unknown in Argentina, was noted on wheat from Uruguay, where the disease was serious. The damage caused by *G. zeae* was increased by that due to *P. graminis*, which became widely prevalent in November.

Stout (H. L.) & Johnson (A. G.). **Frost injury to Wheat heads.**—*Plant Dis. Reptr*, xxx, 10, p. 370, 1 fig., 1946. [Mimeographed.]

During May, 1946, wheat heads over a considerable area in western Kansas and to some extent in central Nebraska developed frost injury. At the Garden City Branch Station, Kansas, the temperature was 27° F. for two hours on the morning of the 11th. Comanche wheat on the rotation plots was in head, and an average of about 70 per cent. of the florets were killed. Those past the blooming stage developed normal kernels and also those at the tip or base of the spike, or both, which were probably in the pre-bloom stage. Kernels one-half to two-thirds developed were mostly killed, and such kernels at harvest were much shrunken, almost devoid of starch, feather-light, and non-viable.

Stevenson (J. A.) & Johnson (A. G.). **The nomenclature of the Barley leaf rust.**—*Plant Dis. Reptr*, xxx, 10, p. 372, 1946. [Mimeographed.]

The authors accept Buchwald's view that the valid name for the barley leaf rust (*Puccinia simplex* (Körnicke) Erikss. & Henn. or *P. anomala* Rostr.) is *P. hordei* Otth [*R.A.M.*, xxv, p. 107], and they list among the synonyms *Aecidium ornithogaleum* Bub. and *Dicaeoma anomalum* Arth. & Fromme. The dwarf or brown leaf rust [ibid., xvii, p. 593], for which Buchwald proposed the name *P. hordei-murini* [loc. cit.], is present in the United States from Oregon to southern California on *Hordeum murinum* and related species.

Meehan (Frances) & Murphy (H. C.). **A new Helminthosporium blight of Oats.**—*Science*, civ, 2705, pp. 412–414, 1946.

A blight affecting mainly varieties and selections of oats (*Avena sativa*, *A. byzantina*, and their hybrids) with the Victoria type of resistance to crown rust (*Puccinia coronata avenae*) was reported in 1946 from 19 States of the American Union between Texas and New York and from Florida to Idaho, the severe infection in many areas causing serious yield reductions. The first isolation from oats was made in November, 1944, but the fungus, to which the name *Helminthosporium victoriae* n.sp. is assigned, had previously been isolated from timothy [*Phleum pratense*] seed.

Plants attacked in the seedling stage showed basal necrosis and foliar striping or reddening, proceeding from the lower leaves upwards. The same symptoms were characteristic of plants infected at a later stage of maturity, but in such cases identification of the disease was based on the stem base and root rot, since the foliar symptoms might be attributable to various causes: in the blighted oats they are probably a secondary toxic effect of the basal decay. Mature field plants were blackened at the nodes by abundant sporulation, and the lower internodes showed a characteristic brownish translucence. Culms weakened by severe infection collapsed near ground-level and at the lower nodes, while harvesting was frequently complicated by excessive lodging.

The conidiophores of *H. victoriae* are erect, simple, emerging usually singly, rarely in clusters of two to five, from the stomata or between the epidermal cells of diseased culms, pale olivaceous to medium-brown, 60 to 280 by 5·8 to 10, mostly 120 to 160 by 6·5 to 7·8 μ, with 4 to 10, generally 6 to 8 septa; the rather closely geniculated, apical spore-producing area is 30 to 80 μ in length. The fuliginous to dark olivaceous, typically pale olivaceous, slightly curved, rather thin-walled conidia, tapering to a rounded tip, measure 40 to 130 by 11 to 25 (70 by 15) μ and are provided with 4 to 11 (8) septa. Germination is effected by one polar germ-tube from each terminal cell. Conidia produced on water agar are somewhat below normal size and have fewer septa than those formed on the host, while weathered spores on the bases of field plants are often dark brown and of irregular shape,

with a thick exospore. The typical colonies on oat agar cultures are pale to medium-grey and tufted; the growth of a profusely sporulating saltant strain is dark greenish-black. The species also occurs as a saprophyte or weak parasite on *P. pratense*, *Dactylis glomerata*, sorghum, *Agropyron cristatum*, *Setaria viridis*, barley, *Paspalum notatum*, *Chloris gayana*, and soy-bean.

Saha (J. C.). **Sphacelial stage in the life-history of Claviceps purpurea (Fr.) Tul.**—*Nature, Lond.*, clviii, 4024, pp. 881–882, 2 figs., 1946.

For the last two years the writer has secured constant yields of ergot (*Claviceps purpurea*) sclerotia [on rye] by artificial methods of production in the tropical plains of Bengal [*R.A.M.*, xxiv, p. 499]. Under these conditions the sphacelial (conidial) phase of the fungus did not end with the usual 'honey-dew' stage within a fortnight of the initiation of sclerotium formation but persisted up to the time of harvesting on the sides of the crevices near the base where small drops of spore-containing 'honey' were detected. The spores of this secondary sphacelial stage were comparable in all respects, including viability, with those of the primary.

Sclerotia stored in slightly damp glass-stoppered bottles were soon overrun by a white, downy growth consisting mainly of conidia of *C. purpurea*, together with a few mycelia. These spores were longer than those of the 'honey-dew' stage.

The high temperature and humidity prevailing from January to April, 1946, when these observations were made, appear to favour the extension of the sphacelial stage of *C. purpurea*.

Hirschhorn (Elisa) & Hirschhorn (J.). **Formas fisiológicas en 'Ustilago zeae' de diversas localidades de la Argentina. Su caracterización geográfica.** [Physiologic races in *Ustilago zeae* from different localities of Argentina. Its geographical characterization.]—*Physis, B. Aires*, xviii, 50, pp. 181–222, 7 pl. (6 col.), 7 diags., 1939. [Received September, 1946.]

An exhaustive, fully tabulated account is given of the authors' studies on seven populations of maize smut (*Ustilago zeae*) [*U. maydis*] from seven localities of Argentina [see next abstract]. The material yielded 510 physiologic races, of which 465 differed among themselves in some or all of their cultural characters, falling into four groups, viz., I from Santa Rosa de Toay (La Pampa) and La Plata, II from Sola (Entre Ríos) and La Estanzuela (R.O. del Uruguay), III from Los Cardones (Tucumán) and Naschel (San Luis), and IV from Macomitas (Tucumán). The last-named differs from all the others in the predominance of grey over beige in its colonies and the large number of colours or shades developing exclusively in cultures of this provenance, namely, pale cinnamon, cacao, yellow-purple, mole-grey, lava-grey, and neutral olive.

Hirschhorn (Elisa) & Hirschhorn (J.). **Acción del pH sobre los caracteres culturales del carbón del Maíz 'Ustilago zeae' (Beck) Ung.** [Action of the pH on the cultural characters of Maize smut *Ustilago zeae* (Beck) Ung.]—*Physis, B. Aires*, xv, 50, pp. 223–251, 11 pl. (9 col.), 11 graphs, 1939. [Received September, 1946.]

For the majority of the monospore cultures of maize smut (*Ustilago zeae*) [*U. maydis*], comprising 33 from each of the seven Argentinian populations under observation [see preceding abstract], an initial pH of 8·1 appeared to be optimal for increase in diameter on Ranker's synthetic medium [*R.A.M.*, x, p. 95]. At pH 3·1 the superficial expansion of the colony is arrested and there is a marked increase in thickness, pallor of colouring, a rough or downy surface, a well-defined margin, brittle consistency, and predominance of the mycelial over the sporidial growth type. The production of mutants begins at pH 5·5 and reaches a maximum at 8·1.

Shands (H. L.) & Schaller (C. W.). **Response of spring Barley varieties to floral loose smut inoculations.**—*Phytopathology*, xxxvi, 7, pp. 534–548, 1946.

Of the various methods tested for the inoculation of barley with loose smut (*Ustilago nuda*) [*R.A.M.*, xxv, p. 552] at the Wisconsin Agricultural Experiment Station, the most effective and convenient consisted in the injection of dry chlamydospores from a rubber bulb into the inflorescences by means of a hypodermic needle. Of the 300 varieties from the C.I. collection comprised in the trials, which have been in progress for about ten years, eight of Abyssinian origin fell into the lowest infection group (0 to 3 per cent.), compared with one each from Australia and Manchuria, three from China, and two from India. Included in the 4 to 15 per cent. class were eight from Manchuria, seven from Abyssinia, three each from Asia and Northern Europe, two each from Australia, Japan, the Middle East and North Africa, and six from India. Of the 22 Egyptian varieties tested, 18 were highly susceptible (61 to 100 per cent. infection), and a similar reaction characterized 13 of the 23 North African. Eight Russian varieties fell into the highest infection class, 11 into the 31 to 60 per cent., and four into the 16 to 30.

Of 24 commercial varieties tested, the most resistant were Trogal, Warrior, Trebi, and Manchuria O.A.C. 21, with 0, 0, 4, and 15 per cent. infection, respectively, and the most susceptible Kindred, Missouri Early Beardless, Plush, Nerval, and Mars (78, 74, 71, 68, and 64, respectively).

Some of the selections from the breeding programme are resistant to loose smut, smooth-awned, and generally desirable from an agronomic standpoint, and efforts are in progress to combine these properties with superior malting quality.

Chowdhury (S.). **Some studies on the smut, Ustilago coicis Bref., of Job's Tears Millet.**—*J. Indian bot. Soc.*, xxv, 3, pp. 123–130, 1 pl., 1 fig., 1946.

Job's tears millet (*Coix lachryma-jobi*) is widely grown for human consumption and poultry feed in Assam, where it is subject to severe infection by *Ustilago coicis*, which converts every grain of the head into a black spore mass, enveloped in a membrane hidden by the glumes, and completely destroys all the ovaries in a raceme. In the Khasi Hills the damage usually ranges annually from 12 to 25 per cent. of the crop and may exceed 35 per cent. The optimum temperature for spore germination is about 30° C. and the optimum pH 6·4. Seed-borne spores are the principal source of infection, and experiments were accordingly carried out in 1943 to determine the value as a control measure of seed treatment with agrosan G, ceresan, formalin dust, and copper carbonate dust. None of the fungicides completely eliminated the smut, but all reduced its incidence to insignificant proportions, copper carbonate being the most effective with a mean infection percentage of 0·25 as against 30 in plants from untreated seed. Almost exactly comparable results were obtained in 1944.

Devarajan (M. R.). **Powdery mildew of Oranges in Coorg.**—*Indian Fmg*, vii, 6, pp. 303–304, 1946.

Dr. B. B. Mundkur supplied the following information on specimens of Loose Jacket orange leaves severely infected by a powdery mildew in Coorg, where the disease assumed major importance in 1943 over the 12,000 acres under cultivation in the province. The fungus was present only in the form of hyaline, oval, or slightly barrel-shaped conidia, 25 to 42 by 11 to 17 μ, with rounded or somewhat flattened appressoria. These measurements approximate closely to those given by Petch (36 to 42 by 15 to 18 μ) for a powdery mildew of citrus in Ceylon (*Phytopathology*, v, p. 350, 1915; ix, p. 266, 1919), and by Fawcett [*R.A.M.*, xv, p. 574] for the same disease in Java, and considerably exceed those reported by Carter (*Phytopathology*, v, pp. 193–195, 1915), for *Oidium tingitaninum* [*R.A.M.*, xviii, p. 794]

in California. In view of these important discrepancies, Dr. Mundkur cannot subscribe to Fawcett's opinion that the oriental and occidental species of *Oidium* are identical, nor does he accept Butler and Bisby's record of *O. tingitaninum* for India [ibid., xi, p. 545]. The Indian *Oidium* is as yet undetermined and should be designated *O.* sp. Good control was effected by dusting with sulphur.

Gondell (M. A.). **La susceptibilidad de diferentes especies y variedades cítricas a la Phytophthora citrophthora (Sm. y Sm.) Leon., P. parasitica Dastur, y P. megasperma Leon. en la zona de Concordia (Entre Ríos).** [The susceptibility of different Citrus species and varieties to *Phytophthora citrophthora* (Sm. & Sm.) Leon., *P. parasitica* Dastur, and *P. megasperma* Leon. [in error for Drechsler] in the region of Concordia (Entre Ríos).]—*Publ. misc. Minist. Agric., B. Aires*, Ser. A, ii, 19, 24 pp., 7 figs., 1946.

All the citrus species and varieties, comprising 16 of sweet orange, two each of mandarin and grapefruit, and one each of lemon, citron, lime, kumquat (*Fortunella* spp.), and bitter orange, inoculated by Klotz and Fawcett's technique [*R.A.M.*, x, p. 98] with *Phytophthora citrophthora* and *P. parasitica* [ibid., xxiii, p. 105; xxiv, p. 500; xxv, p. 55] were more or less susceptible. Those reacting with the most severe symptoms were the Real lemon, the common mandarin, and the Nagami kumquat; the Washington Navel was the most susceptible of the oranges. There were no differences in the effects induced by the two fungi on their hosts except for the more intensive production of gum by *P. parasitica*. *P. megasperma* [ibid., xxiii, p. 294] was pathogenic to three only of the sweet orange varieties, both those of grapefruit tested, and the kumquat.

In general, the writer's results agree with those obtained by other workers along the same lines.

Chapman (H. D.), Vanselow (A. P.), Laurance (B. M.), & Liebig (G. F.). **Soil and nutritional studies in relation to quick decline of Oranges.**—*Calif. Citrogr.*, xxxi, 12, pp. 460–461, 470–472, 3 figs., 1946.

An exhaustive series of experiments on the nutritional aspects of quick decline of oranges [*R.A.M.*, xxv, p. 559], set up to determine whether (1) this disorder is due to some nutritional deficiency or excess, (2) nitrite or any other soil-produced toxin may be involved, and (3) any single or combined fertilizer or soil amendment would alter the course of the disease, led to the conclusion that some factor other than nutrition is the primary cause of quick decline. Nothing was observed to show that toxic substances such as nitrite are in any way involved, nor did it appear that the course of the disease is appreciably altered by any of a considerable number of fertilizer treatments. As, however, insufficient time has elapsed for final judgment to be attempted on many of these treatments, the authors limit themselves to considering it remotely possible that some as yet undiscovered nutrient element may be involved. Many diseased Navel orange trees in the Covina area developed considerable foliage growth in the autumn of 1945, the new leaves at first being green and healthy. Later, however, they faded and a characteristic vein chlorosis appeared which has persisted for some 10 months. This behaviour is characteristic of the 'tristeza' disease of South America [ibid., xxvi, p. 12].

Haas (A. R. C.) & Zentmyer (G. A.). **Control of chlorosis in Citrus leaves.**—*Calif. Citrogr.*, xxxi, 9, pp. 334–335, 346–348, 4 figs., 1946.

Chlorosis of citrus trees is usually found wherever there are alkaline calcareous soils [cf. *R.A.M.*, xxv, p. 559] and also on acid sandy soils in Florida, where iron deficiency may exist. High soil moisture content in calcareous soils over long periods is the most frequent causal factor. Warm autumn weather and a high

nitrogen status may promote late growth, which may fail to turn green during subsequent cold, wet weather, the latter also serving to reduce the availability of iron. Deep cultivation also tends to increase chlorosis.

Having discussed measures formerly adopted for the control of chlorosis in citrus trees [ibid., xiv, p. 753], the authors recommend fermate sprays and dusts as a useful source of iron. A uniform deposit of active iron over the leaf and axils of the petioles is essential to good control and is aided by a spreader or sticker. Iron solubility of the spray deposit is facilitated by adjusting the water to about pH 5 and adding sulphur in amounts not likely to cause burning. Sulphur is also a useful adjuvant in dust applications. Magnetite has been similarly used with success in controlling chlorosis. General improvement of advanced chlorosis in Valencia orange and lemon leaves was recorded 11 days after dusting with fermate or magnetite combined with sulphur. The use of acidifying instead of alkalizing agents as a means of maintaining the availability of the iron should increase the effectiveness of the control.

Wardlaw (C. W.). **A wilt disease of the Oil Palm.**—*Nature, Lond.*, clviii, 4002, p. 56, 2 figs., 1946.

In widely separated areas of the Belgian Congo 4- to 20-year-old oil palms showed necrotic symptoms in the vascular strands of the trunk and roots, the vessels of which became blocked by hyphae and gum. The lower leaves wilted, broke near the base of the petiole, and hung down in a cluster round the trunk. The younger leaves became successively affected, and finally the entire crown was killed and the tree died. Occasionally the leaves were yellowish. Observations indicated that infection occurred, apparently, through the roots or basal trunk wounds. The vascular strands turn greyish-brown to black, first at the periphery and then progressively inwards and upwards to the bases of the crown leaves. The same species of *Fusarium* [see next abstract] was isolated from affected material in various localities. As the disease has already caused considerable loss in various plantations, it requires prompt investigation from every angle.

Wardlaw (C. W.). **Fusarium oxysporum on the Oil Palm.**—*Nature, Lond.*, clviii, 4020, p. 712, 1946.

Dr. W. L. Gordon, of the Dominion Laboratory of Plant Pathology, Winnipeg, has determined as *Fusarium oxysporum* forma a culture of the species isolated by the author several times from oil palms in the Belgian Congo attacked by a vascular wilt disease [see preceding abstract]. Its pathogenicity remains to be tested. A culture of a *Fusarium* isolated from the characteristic leaf disease known locally as patch yellow [*R.A.M.*, xxii, p. 248], to which some genetical types of palm are apparently highly susceptible, has also been identified by Dr. Gordon as a form of *F. oxysporum* closely resembling the wilt strain apart from some differences on certain media.

Venkatarayan (S. V.). **The mycology section.**—*Mysore agric. J.*, xxiii, 2, pp. 58–60, 1945.

In his contribution to the Silver Jubilee Number of the Mysore Agricultural Journal the author comments on some outstanding features of the Mysore Agricultural and Experimental Union's 25-year campaign against plant diseases. An important problem in connexion with the koleroga disease (*Phytophthora arecae*) of areca palm is the existence of alternate hosts of the pathogen, two of which, sandal and *Jatropha* [*curcas*: *R.A.M.*, xxiv, p. 99], are of economic interest, the former as a valuable source of revenue to the State and the latter as a useful fruit.

Mention is made of the progress on coffee black rot (*Corticium koleroga*) and leaf rust [*Hemileia vastatrix*] problems at the Balehonnur Experiment Station [ibid., xxv, p. 448], and of other diseases requiring attention in the State.

VENKATARAYAN (S. V.). **Bud-rot of Areca Palms and 'hidimundige' in Mysore.**—*Nature, Lond.*, clviii, 4024, p. 882, 1946.

Thirumalachar's recent attribution of 'hidimundige' of areca palms to nematode [*Aphelenchus ? coccophilus*] infestation [*R.A.M.*, xxv, p. 161] is not accepted by the author, who maintains that the Hirethota [presumably 'hidimundige'] disease differs from red ring of coco-nuts in several important respects. He further deplores the use of the term 'bud rot' for the eelworm disease. He recalls his previous description of the 'hidimundige' disease in Mysore [ibid., xv, p. 77] and states that the diseased tissues are occupied by a saprophytic *Fusarium* and some bacteria. In some cases an Enchytraeid worm was present but its pathogenicity was doubtful.

CHOWDHURY (S.). **A leaf spot of Borassus flabellifer L. caused by Pestalotia palmarum Cke.**—*J. Indian bot. Soc.*, xxv, 3, pp. 131–137, 1 pl., 1 fig., 1946.

Borassus flabellifer, extensively grown in Assam for its fruit and also for the manufacture of fans from the leaves, is liable to a serious foliar spotting caused by *Pestalotia palmarum*, previously reported on the same host by Uppal *et al.* from Bombay [*R.A.M.*, xiv, p. 654] and by Mundkur and Kheswalla from Bengal and Bihar [ibid., xxi, p. 504]. A three-year survey of the disease in Assam showed that severe leaf infection impairs the fruiting capacity of the plant, besides appreciably reducing the value of the foliage for manufacturing purposes.

The tissues of the yellowish-brown, cream, or darker central region of the spots are abnormally thin and are surrounded by a 1-mm. greyish-brown band. In advanced stages of the disease the lesions may measure up to 5 by 1 or more cm., the centre turning grey and the brown margin darkening. Two to five or more spots may coalesce into irregular, grey, necrotic areas, and on the upper leaf surface the globose, spherical, rectangular, or ovoid, tar-black pycnidia, 130 to 420μ in diameter (85 to 240μ in oatmeal agar cultures), are formed on the centres. *P. palmarum* grew profusely on oatmeal agar, fairly so on maize meal, and sparsely on potato dextrose agar, with well-defined zonation on all substrata. It tolerated a temperature range from 15° to 35° C., with an optimum at 25° to 30°.

Inoculation experiments with monospore cultures of the pathogen on its own host, *Areca catechu*, coco-nut [ibid., xv, p. 15], and *Phoenix sylvestris* were successful only through wounds. The fungus was re-isolated each time.

The fungus survives from one season to the next on diseased leaves on the ground, and fresh primary infections are due to the conidia, which are disseminated by wind and rain. These organs measure 14·4 to 21·6 by 4·7 to 7·2μ in nature and 11·7 to 28·3 by 3·3 to 6·7μ in culture, and are brown, fusiform, curved, quadriseptate, the three middle cells dark and those at the extremities colourless, provided with a short, hyaline, persistent pedicel at the lower end and three, rarely four, colourless appendages, 7·2 to 25·2μ long in nature and 4 to 28·3μ in culture.

Control may be effected by the systematic collection and burning of the diseased foliage, supplemented by fortnightly prophylactic treatments with 2–2–50 Bordeaux-resin-soda mixture.

WELLMAN (F. L.). **Observations on Coffee root rot in El Salvador.**—*Plant Dis. Reptr*, xxx, 7, pp. 247–252, 1946. [Mimeographed.]

Three years' observations on coffee root rot [*R.A.M.*, xvi, p. 657] in El Salvador showed that the most salient symptom is the rapid wilting and death of large, apparently healthy trees. The wilt occurs during the rainy season and is often so

rapid that only a few leaves are shed. The leaves droop, become yellowish-green with bronze and tan markings along the veins or midrib, and soon shrivel. After the dry season has become well advanced, this wilt and collapse do not occur in the drier situations. The fruits mature poorly, and if wet conditions persist, they show numerous infections by *Cercospora coffeicola* [ibid., xxiv, p. 128] and *Colletotrichum coffeanum* [*Glomerella cingulata*: ibid., xxv, p. 154]. Many of the fibrous roots disappear and the larger roots are often partly consumed by decay. Some are covered by a white fungal growth, in others red, dark, or light rhizomorphs are present; in others only shredded remains are left; and in some, all but the fibrous roots are almost intact, though dead. The cause of this root rot has not yet been ascertained, but further work is in progress.

Serious economic loss results when trees in full bearing have to be removed because of root rot, particularly if replanting also fails. Figures obtained from one group of growers showed that from January to November, 1945, an average of 1,262 trees was removed from each of nine plantations, each of an average area of over 88 acres. Affected trees at first occur singly or in a small group forming a centre of infection; other trees then die off round this centre or along the rows in which the disease first appeared. In general, spread takes place from a centre outwards in all directions in moderately level soil, along rows planted on the contour of steep slopes, and downwards from row to row on such slopes.

Attempts at control (by the growers) made by removing diseased trees, filling in the holes with fresh soil, with or without lime or calcium carbide or fertilizers, by trenching round affected areas, and by burning the soil had little effect in arresting the disease or preventing its appearance in replants. There was, however, some evidence that Robusta coffee is highly tolerant of the disease.

Chester (K. S.). **The loss from Cotton wilt and the tempo of wilt development; a study of new uses for old data.**—*Plant Dis. Reptr*, xxx, 7, pp. 253–260, 3 graphs, 1946. [Mimeographed.]

Examination of considerable published data from Arkansas on the incidence of cotton *Fusarium* wilt [*F. vasinfectum*: cf. *R.A.M.*, xxi, p. 74] showed that in variety tests, on an average, for each increase of 5 per cent. in incidence (up to 60 per cent. infection) there was, approximately, a loss of 3 per cent. in seed cotton harvested. Fertilizer test data indicated that when both wilt and soil deficiency (primarily lack of potassium) were present, the reduction of yield was approximately twice that from wilt alone (up to 25 per cent. infection); at higher wilt percentages, most of the loss was attributable to wilt. It was found that plotting incidence on successive dates on semi-logarithmic paper shows up clearly the 'tempo' of wilt development with advance of the season. This 'tempo' appears to be a function of seasonal weather, unrelated to varietal disease reaction or soil treatment, but varying widely in character from one season to another.

Marchionatto (J. B.). **Ensayos de laboratorio con el 'Fusarium vasinfectum'.** [Laboratory experiments with *Fusarium vasinfectum*.]—*Publ. misc. Minist. Agric., B. Aires*, Ser. A, ii, 22, 7 pp., 2 col. pl., 1946. [English summary.]

Two strains of *Fusarium vasinfectum* isolated in 1937 and 1942 from wilted cotton plants of the Delta and Pineland 11A varieties [*R.A.M.*, xx, p. 235; xxi, p. 417], and one (dating from 1933) from Aleppo pine (*Pinus halepensis*), in Argentina, were inoculated into seedlings of the same species grown aseptically in Sachs's nutrient solution in culture tubes. The 1933 isolate was found to have lost its pathogenicity, that of 1937 was still capable of attacking the original host species (cotton), but not pine, and showed attenuation of virulence, while the 1942 isolate was highly aggressive, infecting both cotton and pine, the latter somewhat less severely.

Subramanian (C. V.). **Some factors affecting the growth and survival of Fusarium vasinfectum Atk., the Cotton wilt pathogen in the soil, with special reference to microbiological antagonism.**—*J. Indian bot. Soc.*, xxv, 3, pp. 89–101, 1 pl., 1946.

Using a modification of Cholodny's technique [*R.A.M.*, xiii, p. 471], the writer conducted a series of experiments at the University Botanical Laboratory, Madras, to determine the capacity for persistence in sterilized and unsterilized local soils (sandy compost and sticky black) of two strains of *Fusarium vasinfectum*, the agent of cotton wilt. In the unsterilized soils the pathogen was invariably attacked and decomposed, usually within a month, by antagonistic species of the microflora, mostly bacteria, whereas in the sterilized it developed normally and produced numerous conidia, mainly of the micro type, as well as intercalary and terminal chlamydospores.

Of the soil amendments investigated in relation to the antagonism of soil micro-organisms to *F. vasinfectum*, 3 per cent. manure expedited the decomposition of the fungal mycelium and 1 per cent. monocalcium phosphate [superphosphate] retarded the process to some extent. In sterilized soil the manure treatment greatly stimulated the vegetative activity of the wilt fungus; monocalcium phosphate increased the production of chlamydospores and conidia.

Dastur (R. H.) & Ahad (A.). **Studies in the periodic partial failures of the Punjab-American Cottons in the Punjab. XI. Trends in growth of normal and tirak plants with special studies on bolls.**—*Indian J. agric. Sci.*, xiv, 2, pp. 152–160, 9 graphs, 1944. [Received November, 1946.]

Evidence is adduced that boll growth on Punjab-American cotton plants affected by 'tirak' [*R.A.M.*, xxv, p. 498] did not follow normal trends, the arrest of development preceding the pathological condition. When seasonal factors are adverse during the fruiting stage boll growth is inhibited over an exceptionally wide area, resulting in crop failure, and the same applies to soils of medium or low salinity.

Duddington (C. L.). **Predacious fungi in Britain.**—*Trans. Brit. mycol. Soc.*, xxix, 3, p. 170, 1946.

The following first records of predacious fungi for Britain are reported [cf. *R.A.M.*, xix, p. 472]: *Cystopage lateralis*, *Protascus subuliformis*, *Stylopage* sp. [ibid., xxiv, p. 313], *Meria coniospora*, *Harposporium anguillulae* [ibid., xviii, p. 407], and *Dactylella bembicodes* [ibid., xxiv, p. 58], all from manure heaps and capturing nematodes except the *Stylopage* sp. which consumes small amoebae.

Drechsler (C.). **A species of Harposporium invading its nematode hosts from the stoma.**—*Bull. Torrey bot. Club*, lxxiii, 6, pp. 557–564, 13 figs., 1946.

A Hyphomycete found near Greeley, Colorado, destroying nematodes referable to *Rhabditis* sp. occurring on decaying barley straw, is described and named *Harposporium bysmatosporum* Drechsler n.sp.

Koehler (B.). **Hemp seed treatments in relation to different dosages and conditions of storage.**—*Phytopathology*, xxxvi, 11, pp. 937–942, 1 graph, 1946.

At the Illinois Agricultural Experiment Station seed lots of hemp were treated with arasan and new improved ceresan at the rates of ½, 1, and 2 oz. per bush., and with spergon at 1½ and 3 oz. [*R.A.M.*, xxvi, p. 15]. In 1943, grain moistures were held at 9·4 and 14·3 per cent. and storage temperatures at 32° and 70° F., the corresponding figures for 1944 being 7·6 and 10·1 per cent. and 70° and 90°, respectively. The storage periods in both years were one day, three months, and seven months.

The vitality of both treated and untreated seed deteriorated rapidly in storage

even at 32°. At this temperature the process was apparently not affected by differences in the moisture content, but under warmer conditions it was accelerated by increased moisture. All the disinfectants produced remarkable increases in stand, amounting to as much as 400 per cent. in seed of low vitality. The maximum rate of application of arasan and spergon gave better average results than the lower dosages without injury to the seed. New improved arasan, on the other hand, caused considerable damage when applied at 2 oz. per bush. to high-moisture seed stored for the longer periods at all the experimental temperatures. It should therefore be used at a dosage of 1 oz. per bush.

Massey (L. M.). **Blackspot can be controlled.**—*Amer. Rose Annu., 1946*, pp. 111–118, 1 col. pl., 6 figs., 1946.

A semi-popular account is given of the life-history and mode of infection of the rose black spot fungus, *Diplocarpon rosae*, followed by directions for its control by means of fermate [*R.A.M.*, xxiii, p. 64; cf. xxv, p. 402], used either as a spray (1½ lb. in 100 gals.) or dust (10 per cent.). This preparation requires an admixture of sulphur for the control of powdery mildew [*Sphaerotheca pannosa*], and the same adjunct may also improve its efficacy against black spot and rust [*Phragmidium mucronatum*: see next abstract]. Good results have been secured with a combination of ½ lb. fermate and 3 to 4 lb. wettable sulphur per 100 gals. spray (or for smaller quantities 2 level teaspoonsful of the former and 2 tablespoonsful of the latter per gal.) and with 10 per cent. fermate and 90 per cent. sulphur dust. It is advisable to apply the fermate-sulphur mixtures early and late in the season, and the fermate spray alone, or 10 per cent. fermate and 90 per cent. talc dust, during the summer when temperatures exceed 90° F.

Cochrane (V. W.). **The common leaf rust of cultivated Roses.**—*Amer. Rose Annu., 1946*, pp. 131–135, 1 col. pl., 1946.

This is a semi-popular account of the common leaf rust of roses (*Phragmidium mucronatum*) [*R.A.M.*, xxv, p. 451], with special reference to the environmental conditions governing its occurrence in different parts of the United States, illustrated by a comparison of weather records for San Diego, California, and Ithaca, New York. In the latter locality, and in the north-east generally, the disease is relatively innocuous owing to the unfavourable weather conditions, especially the long, cold winters, which destroy the uredospores; none of these organs withstood a period of over 70 days in outdoor exposure tests. The high summer temperatures act as a further bar to any extensive spread. At 75° F. uredospore germination and infection are noticeably lower than at 64° to 70°, and at 81° infection is virtually absent. At medium humidity the spores remain viable on the foliage for a year at 37°, seven weeks at 64°, and one week at 81°. In southern California, on the other hand, the temperature is uniformly favourable to the pathogen, and from October to April the rainfall is also adequate for the spread of infection. During the winter months, moreover, defoliation may be only partial, permitting the survival of the uredospores, which cause fresh infections with the resumption of active growth of the host: under such conditions the three-stage cycle is curtailed, the spring (aecidial) and autumn (teleuto) stages being eliminated. In the south-east, where the summer temperatures are even higher than in New York, the damage from *P. mucronatum* is negligible. Control may be effected by spraying or dusting with a mixture of fermate and sulphur [see preceding abstract].

Caldwell (J.). **Mosaic disease of the Narcissus.**—*Nature, Lond.*, clviii, 4021, pp. 735–736, 1946.

The author, after reviewing briefly the progress of work on *Narcissus* mosaic [*R.A.M.*, xxii, p. 359; xxv, p. 162], records that further experimentation at Exeter

has confirmed the suggestion that spread is due to some vector on the foliage and that the disease is not seed-transmitted.

It has been found that the chlorotic symptoms may almost disappear from the leaves during the warm days of early summer; consequently great care is needed in the selection of healthy bulbs. It is almost certain that only one virus agent causes the different types of the disease, difference in symptom-expression being due to the variety. Juice from an affected Sir Watkin plant inoculated into Croesus induced symptoms typical of the latter variety. Inoculum from Croesus into a healthy Helios plant produced Helios symptoms, while back-inoculation from Helios to Sir Watkin induced typical Sir Watkin symptoms there. It is, therefore, important that suspected plants of all varieties should be rogued as soon as they are noticed, as they may infect other (and possibly much more susceptible) varieties. *N. jonquilla* and its hybrids and *N. poeticus* varieties appear to be little affected by the disease, whereas some of the *N. triandrus* hybrids appear to be highly susceptible; further, not one case of infection was found among thousands of wild *N. pseudo-narcissus* plants examined.

At present the best method of control consists in careful roguing, inspection beginning early in the growing season before the symptoms are masked by higher temperatures. In small plantings additional protection is afforded by insecticidal spraying. Seedling plants should be grown as far away as possible from diseased stocks.

Sadler (W. T.). **Iris leaf spot.**—*Iris Yearb., 1946*, pp. 101–103, 1946.

On the basis of his experience in east Devon since 1938, the writer recommends for the control of iris leaf spot (*Didymellina macrospora*) [*R.A.M.*, xxi, p. 81; xxii, p. 179] cutting down all spent stems except those carrying the required seed pods, from which only the foliage should be removed; cutting down the foliage fan-fashion (about 6 in. to top point of fan) in the autumn; and heavy applications of wood ash (2 lb. per sq. yd.) to the soil (50 per cent. deficient in potash locally) at the same time. The irises in the writer's garden near London were entirely free from leaf spot between 1906 and 1937, and reports from other parts of the country support his opinion that the fungus is inactive in an impure sooty atmosphere. Colloidal copper sprays were unsuccessful and an experimental dusting with soot was spoilt by rain.

Ark (P. A.) & Barrett (J. T.). **A new bacterial leaf spot of greenhouse grown Gardenias.**—*Phytopathology*, xxxvi, 10, pp. 865–868, 1 fig., 1946.

The symptoms of a bacterial leaf spot causing heavy losses in gardenia plantings in central California resemble those described by Burkholder and Pirone from the eastern United States as due to *Phytomonas gardeniae* [*R.A.M.*, xx, p. 208]. Infection originates on the tender leaves in the form of minute dots which expand into a pale-yellow, later reddish-brown centre, with thickened, somewhat greasy margins, surrounded by a yellowish halo. Several spots may coalesce, and numerous infections tend to cause premature abscission. In exceptional cases the flower buds and sepals may also be involved. The high humidity and temperature maintained for forcing purposes provide ideal conditions for the spread of the disease by means of cuttings from infected plants, and especially by syringing to control red-spider mites, and for the subsequent development of epidemics.

The pathogenicity of the organism isolated from the exudate at the cut edges of diseased leaf tissues was established by inoculation and re-isolation tests in a greenhouse with day and night temperatures of 80° to 90° and 65° F., respectively. The first symptoms of infection appeared a week to nine days after the atomization of potted plants in moist chambers with suspensions of the bacterium in distilled water, and in a fortnight the spots had reached 1 mm. in diameter.

The organism is a rod measuring 1·6 to 2 by 0·3 to 0·5μ, motile by means of one or two unipolar flagella, Gram-negative, but staining with most of the aniline dyes; good growth is made in Cohn's, Uschinsky's, and the synthetic carbohydrate medium of the Society of American Bacteriologists; starch plate is completely digested in six days; indole and hydrogen sulphide are not produced; ammonia is formed in Hansen's peptone-glucose-dipotassium phosphate media (*J. Bact.*, xix, p. 223, 1930); nitrates are not reduced; skimmed milk is precipitated and litmus milk coagulated; gelatine is slowly liquefied. Arabinose, dextrose, fructose, galactose, lactose, maltose, mannitol, raffinose, sucrose, and xylose were utilized for the production of acid, but no gas was formed. The bacterium developed over a range from 10° to 37° C., with an optimum at 22° to 28° and a thermal death point of 50°. It differs strikingly in its yellow colonies (sulphine-yellow on potato dextrose-peptone agar) from *P. gardeniae*, with its dirty white growth and dark-brown discoloration of the medium, and is considered to be a new species, to which the name of *P. maculifolium-gardeniae* is assigned.

A reduction in the number of lesions was effected by spraying with a 1 in 2,000 copper sulphate solution plus a spreader of 0·1 per cent. triton B–1956 phthalic glyceryl alkyd resin, which should be applied at frequent intervals to prevent the accumulation of inoculum on old leaves. Fumigation should be substituted for syringing as a means of combating red spiders, since the latter practice definitely aggravates the leaf spot.

Ark (P. A.) & Tompkins (C. M.). **Bacterial leaf blight of Bird's Nest Fern.**—*Phytopathology*, xxxvi, 9, pp. 758–761, 1 fig., 1946.

Bird's nest fern (*Asplenium nidus*), which is widely grown under glass in the San Francisco Bay region of California, has been attacked recently by a destructive bacterial disease (apparently the first to be recorded on a fern) causing losses running into thousands of dollars in individual cases. The first symptoms are small, water-soaked, translucent spots, usually on the upper side of the frond, which rapidly expand under warm, humid conditions and cover the entire surface. The bacterium may also gain entrance to the plant through the water pores at the apex of the frond. Necrosis of one or more fronds spoils the symmetry of the plant and renders it unmarketable.

The causal organism was readily isolated from the diseased tissues on potato dextrose-peptone agar and inoculated into healthy ferns under conditions approximating to those prevailing in the affected nurseries. Re-isolations from the experimentally infected plants yielded strains which were identical with the original isolates and in turn gave positive results in inoculation tests. The bacterium, to which the name *Phytomonas asplenii* is assigned, is a Gram-negative rod, 1·2 to 2·4 by 0·3 to 0·5μ, motile by means of one to three polar flagella. On the above-mentioned medium, the heavy, greyish-white, butyrous growth induces a gradual darkening of the substratum. Skimmed and litmus milk are not curdled. Indole is not formed in Dunham's solution, but ammonia is produced in P. A. Hansen's peptone-glucose-dipotassium phosphate media (*J. Bact.*, xix, pp. 223–229, 1930). Nitrates are not reduced to nitrites. Acid without gas is evolved in Fermi's solution supplemented by inverted Dunham fermentation tubes and in dextrose, sucrose, maltose, arabinose, xylose, glycerine, galactose, and fructose. Starch is not hydrolysed but gelatine is liquefied. The organism is a facultative anaerobe, developing at a temperature range of 1° to 34° C., with an optimum at 22° to 30° and a thermal death point of 50°.

Control measures comprise steam sterilization of the brick-dust and rat's-nest media (the latter a natural forest compost), flats, and pots, transplanting with sterile forceps, sparing use of water, and maintenance of a moderately dry atmosphere in the greenhouse.

Glasscock (H. H.) & Ware (W. M.). **Uromyces striatus Schroet. on Medicago lupulina L. and other host plants in Britain.**—*Trans. Brit. mycol. Soc.*, xxix, 3, pp. 167–169, 1946.

A seven-acre field of trefoil (*Medicago lupulina*) near Faversham, Kent, examined on 17th October, 1945, was found to be infested by a rust similar to that described by Groves (The British Rust Fungi, p. 93, Cambridge, 1913) as the uredo and teleutospore stages of *Uromyces striatus*. The attack was virulent in large, pronounced patches, the leaves had been killed, and were covered by pustules. The fungus could not be found on an adjacent crop of lucerne, usually susceptible in the United States [*R.A.M.*, xxii, p. 209] and parts of Europe [ibid., xviii, p. 397]. Ogilvie and Munro reported an outbreak of this disease at Chedzoy, Somerset, in November, 1945.

A survey of the literature indicates that the only valid records of *U. striatus* in Britain are for *M. arabica*. In view of the fact that every British specimen of *U. striatus* on *Trifolium* spp. examined by the authors has proved to be *U. jaapianus*, all published records of *U. striatus* occurring on *Trifolium* will require confirmation. *U. striatus* is here recorded for the first time on a crop plant, *M. lupulina*, in Britain.

Palti (J.). **Diseases of fodder crops and their control.**—*Hassadeh*, xxv, 7, pp. 240–242, 1 fig., 1945. [Hebrew.]

The most important foliar disease of Egyptian clover (*Trifolium alexandrinum*) in Palestine is caused by *Ascochyta trifolii* [*R.A.M.*, xxiv, pp. 193, 476], while a serious root rot is due to a widespread unidentified species of *Fusarium*. Of less frequent occurrence, but also potentially destructive, are *Rhizoctonia* [*Corticium*] *solani*, *Sclerotinia sclerotiorum*, and *S. trifolii* [? *S. trifoliorum*]. The *Fusarium* and *C. solani* root rots also affect lucerne, but usually only in a mild form.

Rust (*Uromyces fabae*) and chocolate spot (*Botrytis fabae*) are limiting factors in broad bean cultivation in Palestine [cf. ibid., xx, p. 442]. The first symptoms of chocolate spot and rust generally appear in early January and during February, respectively, so that October-sown crops are the most likely to escape infection. Copper spraying is effective against both diseases, but is economic only in cases where a single application will confer protection until the onset of dry weather in April precludes further material damage. The susceptibility of vetch to *U. fabae* renders it unsuitable as a near neighbour of broad beans.

A. fabae, an occasional parasite of the leaves, stalks, and pods, is seed-borne [ibid., xxiii, p. 167], and stringent precautions should be taken to eliminate contamination from this source. Field peas suffer from the same diseases as broad beans, with the exception of chocolate spot, but usually in a less severe form. Rust (*U. pisi*) and leaf spot (*A. pisi*) are moderately prevalent.

Maize and sunflower rusts (*Puccinia* spp. and *P. helianthi*, respectively) occur throughout the country, the latter being the only pathogen of importance on its host.

Cercospora beticola is common on beets, but seldom injurious to the fodder varieties. Crown gall (*Bacterium tumefaciens*) is also frequently observed, while *Urophlyctis pulposa* [ibid., xxii, p. 497] is occasionally found.

Leach (J. G.) & Ryan (Mary A.). **The cytology of Ustilago striiformis forma poae-pratensis in artificial culture.**—*Phytopathology*, xxxvi, 10, pp. 876–886, 6 figs., 1946.

A cytological study at the West Virginia Agricultural Experimental Station of *Ustilago striiformis* from bluegrass (*Poa pratensis*) on potato dextrose agar [*R.A.M.*, xxv, p. 264] indicated that the smut is normally homothallic. It produced both a

haploid and diploid (syncaryotic) vegetative mycelium and has no true dicaryophase. The chlamydospore is occupied by a large, apparently diploid nucleus, which seems to undergo reduction division soon after spore germination. The germinating spore produces a branched germ-tube of indeterminate structure in place of a true promycelium. Sporidia do not develop and hyphal fusions were not observed. A partial reassortment of nuclei occurs in the branching germ-tube or resultant mycelium, followed by caryogamy without an intermediate dicaryophase. The syncaryotic cells multiply vegetatively, forming a characteristic fragmenting mycelium quite distinct from the radiating haploid form: each cell of the short fragments into which the former disintegrates contains a single large, apparently diploid nucleus, and may either be transformed directly into a chlamydospore or divide to produce new syncaryotic cells.

Blattný (C.) & Stary (B.). **Atlas of the injurious agencies affecting our fruit trees and shrubs. Second edition.**—375 pp., 130 col. pl., Plant Protection Institute of the Agricultural Experimental Stations in Prague, 1944. [Received December, 1946.]

In a brief foreword the authors state that the chief purpose of this work was to supply the local fruit-growers with a collection of photographs (or drawings in a few cases where photographs could not be taken), showing the most typical injuries caused to fruit trees and shrubs (including the vine, strawberry, and a few wild berries) in Czechoslovakia by various pathogenic agencies, such as environmental, atmospheric, and soil conditions, physiological factors, bacterial and fungal diseases, and insect and animal pests. These photographs are given in the 130 beautifully executed coloured plates appended at the end of the volume, and supplemented by brief descriptions in semi-popular language of the respective symptoms observed on the host plants. Besides indicating the control measures applicable in each separate case, a special chapter gives a full list of all the chemical preparations which have been tested and officially approved in Czechoslovakia for the control of the diseases and pests, including a wide range of proprietary compounds, indicating their composition and sources of supply.

Heiberg (Barbara C.) & Ramsey (G. B.). **Fungistatic action of diphenyl on some fruit and vegetable pathogens.**—*Phytopathology*, xxxvi, 10, pp. 887–891, 1946.

Of 52 pathogens of fruits and vegetables grown in pure culture on potato dextrose agar in the presence of vapour from diphenyl [*R.A.M.*, xxv, p. 112] crystals at dosages ranging from 1 to 20 mg. per plate, the most sensitive were *Aspergillus* spp. from nectarines, the colonies of which were barely perceptible after a week compared with 45 mm. diam. in the control series, *Botrytis allii* and *B. cinerea* (0 and 0 and 80 and 80, respectively), *Coryneum beijerinckii* [*Clasterosporium carpophilum*] (trace and 28), *Diplodia natalensis* (trace and 80), *Dothiorella* sp. from avocado (trace and 80), *Endoconidiophora* [*Ceratostomella*] *paradoxa* (trace and 80), *Macrophomina phaseoli* (trace and 80), *Melanconium* sp. from tomato (trace and 33), *Monilinia* [*Sclerotinia*] *fructicola* (0 and 55), *Pellicularia* [*Corticium*] *microsclerotia* [ibid., xxiv, p. 80] (trace and 70), *Penicillium digitatum*, *P. expansum*, and *P. italicum* (trace, 0, and trace and 63, 47, and 80), *Phoma* sp. from apple (6 and 76), *P. betae* (8 and 71), *P. destructiva* (10 and 57), *Phomopsis* [*Diaporthe*] *citri* (12 and 57), *P. vexans* (11 and 79), *Phyllosticta straminella* (8 and 72), *Pleospora lycopersici* (trace and 56), *Rhizoctonia* [*C.*] *solani* (8 and 80), *Rhizopus nigricans* [*R. stolonifer*: but see ibid., xxiii, p. 237] (trace and 80), *S. intermedia* (0 and 55), *Sclerotium rolfsii* (trace and 80), and *Septoria citri* (trace and 12). The action of the chemical, however, was merely fungistatic, arresting vegetative growth and preventing normal sporulation but not destroying the organisms.

The use of diphenyl-impregnated wraps may control decay in the commodities subject to infection by the above-mentioned common fungal rots, but in many cases the retention of the odour will preclude this application of the chemical.

The differential fungistatic action of diphenyl on many fungi can be utilized as a practical laboratory method for the decontamination of important pathogenic organisms.

Dunne (T. C.). **'Wither tip' of Apple trees.**—*J. Dep. Agric. W. Aust.*, xxiii, 2, pp. 124–127, 5 figs., 1946.

Evidence of copper deficiency causing wither-tip or summer die-back of apple trees in West Australian orchards [*R.A.M.*, xvii, p. 534; cf. xxv, p. 505], aggravated by the limited supply of that element during the war years, led the author to review the benefits obtained by various copper treatments. Trees which, although unthrifty, did not show severe wither-tip symptoms also responded excellently to copper applications.

Dunne (T. C.) & Gulvin (A. T.). **Manganese deficiency of Apple trees.**—*J. Dep. Agric. W. Aust.*, xxiii, 2, pp. 127–130, 4 figs., 1946.

A manganese Burgundy mixture consisting of 4 lb. manganese sulphate and 4 lb. sodium carbonate to 40 gals. water sprayed on to leaves of apple trees in West Australian orchards during November or early December successfully corrected manganese deficiency [*R.A.M.*, xxiii, p. 29; xxv, p. 120], which is usually severe in dry summers and where surface soils are light or very gravelly. Soil applications of manganese sulphate at the rate of 2 to 4 lb. per tree applied in August in a band 12 to 18 in. wide at the limit of the branches also gave satisfactory results, which did not, however, always become apparent in the succeeding season. Both methods of treatment are recommended for severe cases. It has been found that manganese deficiency exists in several districts in Western Australia and in some is increasing. At Kendenup it is widespread, and in the King and Kalgan River areas, at Mt. Baker, Denmark, Donnybrook, and in the hills east of Perth acute cases have been noted.

Kienholz (J. R.) & Childs (L.). **Reduction in yield of the Anjou Pear caused by wettable-sulphur spray.**—*Phytopathology*, xxxvi, 9, pp. 777–779, 1946.

From 1942 to 1945, inclusive, a significant reduction in the yield of Anjou pears in the Hood River Valley, Oregon, has resulted from the application of a wettable sulphur spray (8 in 100) for scab (*Venturia pirina*) control [*R.A.M.*, xxv, p. 69]. For instance, in 1944, the percentage of blossoms setting their fruits after three treatments (pink, calyx, and first cover) with wettable sulphur was 1·9, compared with 3·4, 2·5, and 3·5, respectively, for the control trees and those sprayed with fermate (1·5 in 100), and copper phosphate-lime-bentonite (4–4–4–100), respectively. In 1945 the corresponding figures were 1·80, 2·84, 3·04, and 3·71, respectively. Since wettable sulphur is also ineffectual against scab and causes russeting, its application to Anjou pears should be discontinued locally in favour of copper phosphate or fermate, which improve the appearance of the fruit and foliage besides increasing production.

Cation (D.). **Stone fruits affected by 50 known virus diseases.**—*Amer. Fruit Gr.*, lxvii, 2, pp. 8–9, 20, 7 figs., 1946.

This is a popular note on the symptoms, diagnosis, and control of stone fruit virus diseases, among which the peach yellows, little peach [suspected to be a strain of the foregoing], red suture, and X-disease viruses, and the cherry yellows virus are selected as the principal representatives of the group in Michigan [*R.A.M.*, xxii, p. 142 *et passim*].

Zwirn-Hirsch (H. E.). **Infection experiments with aeciospores of Tranzschelia pruni-spinosae (Pers.) Diet. in Palestine.**—*Palest. J. Bot.*, J. Ser., iii, 3, pp. 178–179, 1945.

Tranzschelia [*Puccinia*] *pruni-spinosae* is widely distributed in its pycnidial and aecidial stages on the wild anemone, *Anemone coronaria*, and in its uredo and teleuto phases on almond, apricot, peach, plum, cherry, and other species of *Prunus* [*R.A.M.*, xv, p. 683; xxiii, p. 262]. In an attempt to establish a genetic connexion between the two stages, almond, apricot, and plum trees were inoculated with aecidiospores from *A. coronaria* leaves. Typical infections resulted on the two first-named after incubation periods of 51 and 18 days in February and May, respectively, compared with three months in Europe.

An examination of the Palestine herbarium specimens, all on cultivated *P.* spp., showed them to be of the forma *discolor*, whereas those from Rumania [ibid., viii, p. 17] were of f. *discolor* on apricot and of f. *typica* on wild *P.* spp. [ibid., xvii, p. 756]. The Palestine species is considered to be of the forma *discolor*.

The aecidia of the rust are very common on *A. coronaria* in Palestine, where their development slightly precedes the unfolding of foliage on the fruit trees; diseased leaves of the former, however, last much longer than sound ones and are still fresh when those of the fruit trees unfold. The mode of propagation of *P. pruni-spinosae* requires further study. The full life-cycle may well be completed in the hilly region of the country, where *A. coronaria* flourishes in the vicinity of orchards and the trees shed their foliage throughout the winter, while overseasoning uredospores may afford the chief source of new spring infections in the coastal plain, where a few leaves often remain on the trees.

Scaramuzzi (Nia). **A mosaic disease of the Almond.**—*Int. Bull. Pl. Prot.*, xx, 9–10, pp. 77M–80M, 1946.

Groups of almond trees in the Province of Bari, Italy, were observed to show a leaf spot due to the presence of discoloured zones ranging from pale green to white. The spotting was irregularly distributed and was apparent in the central zone, at the base or extremity of the blade, and along the veins or margins. The lesions were at first punctiform, but later enlarged and showed a more marked discoloration. Folding and contraction of the leaves were also frequently observed. Towards the end of June many leaves turned completely yellow and fell, while the affected ones which did not fall reassumed a normal appearance. Towards September, however, the spotting again appeared. The most severely affected leaves were often noted on the outer rim of the foliage, so that in badly diseased trees the extremities appeared completely yellow. The Rachele, Scagliona, Mincaccetta, and Mandorla amara varieties appeared to be unaffected.

On a basis of the available evidence the author concluded that the condition was a form of mosaic due, probably, to a virus [cf. *R.A.M.*, xviii, p. 188]. Grafts from affected trees to peaches (in Bari) and almonds (at Rome) gave rise to characteristic symptoms.

Demaree (J. B.). **Rate of spread of Blueberry stunt in North Carolina.**—*Plant Dis. Reptr*, xxx, 9, pp. 321–325, 1 diag., 1946. [Mimeographed.]

The virus disease of blueberries (*Vaccinium australe*) known as stunt [*R.A.M.*, xxiii, p. 395; xxiv, p. 266; xxv, p. 330] spreads rapidly in North Carolina and New Jersey once it has become established, whereas such spread is either slow or lacking in Massachusetts, Michigan, and New York. It is possible that the rate of dissemination in the field may be determined by an insect vector. Circumstantial evidence suggests that first infections in new and isolated plantings arise from affected propagating material. Records of spread in a 10-acre blueberry field in

North Carolina showed that the percentage of infected plants increased in one block from 4·7 in 1942 to 47 in 1945.

Arango y Mestre (O.). **Insectos y enfermedades en el cultivo de la Fruta Bomba.** [Insects and diseases in Papaw cultivation.]—*Rev. Agric., Habana*, xxix, 1, pp. 77–80, 3 figs., 1946.

Brief notes are given on the symptoms and control of papaw bunchy top [*R.A.M.*, x, p. 398], *Pucciniopsis caricae*, *Oidium caricae* [ibid., xxiv, p. 51], *Gloeosporium* [? *papayae*], *Rhizopus*, *Rhizoctonia*, and *Cladosporium* spp., and *Mycosphaerella caricae* [ibid., xxi, p. 88], of which the first-named is the most important in Cuba.

Das Gupta (S. N.) & Sinha (S.). **Studies in the diseases of Mangifera indica Linn. IV. Investigations into the pathological histology of fruits affected with 'black-tip' disease with a note on the anatomy of the fruit.**—*Proc. nat. Acad. Sci., India* (formerly *Proc. Indian Acad. Sci.*), xiv, 3, pp. 102–108, 1 pl., 1944. [Received January, 1947.]

In this paper of the present series [*R.A.M.*, xviii, p. 329; xx, pp. 172, 313; xxv, pp. 127, 267] the authors describe the histological changes induced in mango fruits by necrosis or black-tip disease. The first symptom appears to be the deposition of a brown substance in the lumen of the vessels of the outer mesocarp at the distal end of the fruit. The brown discoloration spreads to the neighbouring parenchyma while the deposits also appear in the ducts. Browning and deposits gradually spread throughout the mesocarp, the affected cells disintegrating and coalescing into a dead tissue. In severe cases the necrosis extends to the endocarp. The epidermis breaks at certain points, and the break continues in the adjacent mesocarp; fissures form in the fruit, through which the brown substance oozes out, later hardening into a dry mass.

Roberts (J. W.). **Recent developments in fungicides. II. Spray materials—1936–1944.**—*Bot. Rev.*, xii, 9, pp. 538–547, 1946.

This review of the developments that took place between 1936 and 1944 in the improvement of the older standard fungicides and the evolution of new ones is designed to serve as a continuation of the author's earlier paper on the same subject [*R.A.M.* xvi, p. 332]. The present work deals with organic fungicides, derivatives of the dithiocarbamic acids, diphenylamines, chlorine derivatives of quinone and naphthoquinone, and certain other compounds. There is a bibliography of 65 titles.

Foister (C. E.). **The relation of weather to fungus diseases of plants. II.**—*Bot. Rev.*, xii, 9, pp. 548–591, 1946.

This review of the outstanding literature dealing with the correlation between weather and plant diseases is supplementary to the author's paper on the same subject published in 1935 [*R.A.M.*, xv, p. 383]. The subject is discussed under the main headings of predisposing factors, germination, disease initiation and epidemics, soil conditions and plant diseases, apparatus useful in aerobiology, and practical applications of the data obtained to methods of disease control. There is a bibliography of 267 titles, which, except in special cases, contains no references to papers published before 1935.

Vestal (E. F.). **Observations on economic plant disease fungi and weather at Allahabad, India, during the 1945–46 crop seasons.**—*Plant Dis. Reptr*, xxx, 8, pp. 284–298, 3 graphs, 1946. [Mimeographed.]

An account is given of the plant disease situation during 1945–6 in the vicinity of Allahabad, India, in relation to the prevailing weather conditions. Low tem-

perature and humidity from June to September, 1945, resulted in much-reduced activity of the leaf-spotting fungi (such as *Cercospora*, *Phyllosticta*, and *Colletotrichum*), whereas some species ordinarily saprophytic (*Choanephora cucurbitarum*) [*R.A.M.*, xix, p. 514] became abundant everywhere. Lowering of the temperature during October with a rise in humidity favoured root-rotting fungi. November to February, 1946, was marked by very low rainfall and this resulted in the late appearance of *Puccinia triticina* on wheats and *P. glumarum* and *P. graminis* on wheat and barley.

GARRETT (S. D.). **A multiple-point inoculating needle for agar plates.**—*Trans. Brit. mycol. Soc.*, xxix, 3, pp. 171–172, 1 diag., 1946.

A 10-point inoculating needle has been devised for the multiple inoculation of agar plates with agar mycelial disks. It consists of ten 15-cm. lengths of No. 20 gauge steel wire with one end of each hammered flat and each wire bent through an angle of 60° 6 cm. from the flattened end, and then at right angles in the reverse direction 10 cm. from the same end, both angles being in the plane of the flattened tip. The ten lengths are clamped to a grooved wooden holder. After sterilization of the points, the inoculum plate, in which agar disks have been cut with a sterile cork borer, is held upside down above eye-level, and an agar disk removed on one of the points. The instrument is then twisted slightly and a second disk removed on the next point, and so on. The inoculant plate is then held in a similar position, while the disks are transferred one by one to previously marked positions. Sixty-five plates were inoculated in four hours during the first trial of this technique, six plates developing a single contaminant colony, only two of which had to be discarded.

STEINHAUS (E. A.). **Insect microbiology. An account of the microbes associated with insects and ticks with special reference to the biologic relationship involved.**—x+763 pp., 244 figs., 6 diags., Ithaca, New York, Comstock Publishing Company, Inc., 1946. $7.75.

Included in this comprehensive work, described in the author's preface as an attempt to treat the various associations and relationships existing between all types of microbes and insects (including ticks and mites) from a biologic standpoint, and, in a sense, to serve as a compendium of the data concerned [cf. *R.A.M.*, xix, p. 593], are chapters on the specific bacteria associated with insects (III, pp. 38–187), yeasts and insects (VI, pp. 348–375), fungi and insects (VII, pp. 376–412), and viruses and insects (VIII, Sect. B, pp. 443–450). The bacteria and fungi are arranged systematically and their relationships with the insects concerned are described. The viruses are treated according to the mode and agent of transmission [cf. ibid., xx, p. 218]. A survey of the insects associated with willows [*Salix* spp.] revealed the frequent presence in the wood of larvae of the gall midge (*Rhabdophaga saliciperda*) and sawfly (*Euura atra*), which are strongly suspected as agents in the transmission of watermark disease, due to *Erwinia salicis* in England [ibid., xx, p. 432].

An 88-page bibliography and author and subject indices are appended.

SCRIBNER (B. W.) & ABRAMS (E.). **Effect of mildew on caselining material.**—*Paper Tr. J.*, cxxiii, 15, pp. 132, 134, 136, 138, 140, 1946.

At the request of the War Production Board, an investigation of the mildewing of case-lining materials under tropical conditions [cf. *R.A.M.*, xxv, p. 466 *et passim*] was undertaken at the National Bureau of Standards, Washington, D.C. Samples of sheetings for the lining of shipping cases, kraft paper used in their manufacture asphalt-laminated kraft papers, and liner seams sealed with various adhesives were hung in a room in which the temperature was maintained at 75°±1° F. for six

hours and at 85°±1° for the other 18 in each 24-hour period, and the relative humidity held at 95±2 per cent. during the first six and at 90±2 per cent. for the remaining 18 hours. The specimens were removed at the end of three or four successive four-week periods, examined for fungal infection, and tested for deterioration.

Mildew growth ranged from slight to heavy on the different samples, and the extent of disorganization was generally, though not consistently, correlated with the presence or absence of moulds, notably *Chaetomium globosum* and *Penicillium* sp. Other species observed were *Aspergillus niger*, *A. oryzae*, and *Actinomyces* sp. Papers reinforced with strands of sisal fibres or jute scrim cloth, and sheetings with cotton wadding or cotton cloth as a component, deteriorated much more rapidly than the other laminated samples. The maximum percentage decreases from the original tearing resistance, tensile strength, stretch, and water resistance of the asphalt-laminated papers were 70, 80, 70, and 90, respectively. The rate of deterioration of the asphalt-coated kraft papers was rapid and rose parallel with the melting-point of the asphalt fraction. In pure-culture tests the mildew growth was very heavy on the paper and very light on the asphalt. None of the adhesives, composed of asphalt, rubber, and synthetic resin mixtures, showed significant failure after the exposures.

Soderberg (F. A.). **Mildewproofing of paper mill felts.**—*Paper Tr. J.*, Tech. Sect., cxxii, 25, pp. 281–282, 1946.

Dihydroxydichlorphenyl methane (preventol GD) [*R.A.M.*, xxiv, pp. 427, 428; xxv, p. 571], which was found to be of value during the war for the prevention of mildew on military equipment [ibid., xxv, p. 466 *et passim*], has now been applied with satisfactory results to papermakers' felts at the General Dyestuff Corporation, New York. By the suppression of the fungal and bacterial agents of mildew it extends the life of the felt (from 6 to 22 and 28 days in one trial), besides affording protection against moths. The application of the chemical is quite simple, consisting merely in the impregnation of the new felt by means of a dipper, spray pipe, or immersion, followed by a weak acid solution to precipitate the compound on the wool. The cost is less than $3 per 100 lb. felt.

[This information is also presented in *Pulp Pap.* (*Mag.*) *Can.*, xlvii, 13, pp. 88–89, 1946.]

Baars (J. K.) & Bogtstra (J. F.). **Torulopsis utilis, de moderne voedingsgist.** [*Torulopsis utilis*, the modern food yeast.]—*Natuurwet. Tijdschr. Ned.-Ind.*, cii, 7, pp. 135–139, 1946. [English summary.]

An account is given of the production in Java, on a medium of cleared molasses and ammonium sulphate, of the food yeast, *Torulopsis utilis*, which was started on a small scale in December, 1941, and continued, subsequent to the Japanese invasion, in the European internment camps, where it was used in the treatment of various ailments and in the manufacture of bread. The work has now been resumed at Batavia for the primary purpose of developing a product utilizable as a complementary factor in the often very scanty native diet [cf. *R.A.M.*, xxiv, p. 7 *et passim*].

Sperber (E.). **Studies in the metabolism of growing Torulopsis utilis under aerobic conditions.**—*Ark. Kemi, Min. Geol.*, xxi A, 3, pp. 1–136, 4 figs., 4 diags., 12 graphs, 1945.

This fully tabulated and documented account of the author's intensive studies at the Wenner-Gren Institute for Experimental Biology, Stockholm, on the growth of *Torulopsis utilis* [*R.A.M.*, xxiii, p. 399 and cf. preceding abstract] under aerobic conditions comprises, *inter alia*, a description of a new respirometer to measure

oxygen and carbon dioxide metabolism, an investigation of the composition of the yeast, notes on its growth with different nitrogen sources and on the turn-over of different carbon compounds by the organism, and particulars of respirometer experiments with growing *T. utilis*. A bibliography of 92 titles is appended.

Wickerham (L. J.), Flickinger (May H.), & Burton (K. A.). **A modification of Henrici's vegetable-juice sporulation medium for yeasts.**—*J. Bact.*, lii, 5, pp. 611–612, 1946.

Satisfactory sporulation of *Hansenula, Zygohansenula, Pichia, Zygopichia, Saccharomyces, Zygosaccharomyces,* and *Debaryomyces* spp. has been obtained, after incubation periods ranging from within three days for the first four to as long as 20 for the last-named, on a medium consisting of the contents of a can (1 pint, 2 fl. oz.) of the mixed juice of eight vegetables (pH 6·8) with one-half of a cake of compressed yeast dispersed in it. The mixture is steamed for ten minutes, readjusted to pH 6·8, and added to an equal volume of hot distilled water containing 4 per cent. malted agar. The two solutions are mixed, bottled or tubed, and sterilized for 15 minutes at a pressure of 15 lb.

Brian (P. W.), Curtis (P. J.), Hemming (H. G.), & McGowan (J. C.). **A substance causing abnormal development of fungal hyphae produced by Penicillium janczewskii Zal. I. Biological assay, production and isolation of 'curling factor'. II. Preliminary notes on the chemical and physical properties of curling.**—*Trans. Brit. mycol. Soc.*, xxix, 3, pp. 173–187, 2 figs., 1946.

During the investigations which showed that the toxicity of Wareham Heath soil [*R.A.M.*, xxiv, p. 332] was due almost entirely to antibiotic substances produced by *Penicillium janczewskii, P. jenseni,* and a group referable to the *P. nigricans-janczewskii* series of Thom [ibid., ix, p. 410], it was found that *P. janczewskii* produced an antibiotic distorting the germ-tubes of *Botrytis allii*. The preparation and properties of this substance are described. Known as 'curling factor', it is produced more abundantly in media containing nitrogen as nitrate than as ammonium salts or peptone. By chemical extraction 'curling factor' was obtained in pure form as colourless crystals.

Concentrations of 25 μgm. per ml. of 'curling factor' cause stunting of the conidial germ-tubes of *B. allii* and their early cessation of growth. Although concentrations of 100 μgm. per ml. did not inhibit germination, considerably lower concentrations (1 μgm.) caused the serious physiological effects described.

J. C. McGowan adds a preliminary note on the purification and chemical and physical properties of 'curling factor'.

Stone (R. W.) & Farrell (M. A.). **Synthetic media for penicillin production.**—*Science*, civ, 2706, pp. 445–446, 1946.

Formulae are given for synthetic media for the production of penicillin from surface and submerged growth, shake flask, stirred bottle, and tank cultures. The media are useful for research purposes owing to the greater ease with which the penicillin can be purified and to the greater sensitivity of response to chemical adjuvants. Growth is slower than with maize steep media, and the yields slightly lower.

Cook (R. P.) & Brown (Margaret B.). **Synthetic media for penicillin production.**—*Bio-chem. J.*, xl, 4, pp. xlix–l, 1946.

Applying the results obtained by the use of fractions prepared from aqueous extracts of ground dried or green peas, the writers have attempted to formulate a synthetic medium affording high penicillin yields [*R.A.M.*, xxv, p. 467]. Most of the experiments were carried out with surface cultures of *Penicillium notatum*

NRRL 1249 B21, but *P. notatum* NRRL 2000 (x1612) in submerged aerated culture was also used. The basal medium contains (as gm. per 100 ml.) sodium nitrate 0·3, potassium phosphate 0·05, crystalline magnesium sulphate 0·025, sodium chloride 1, and lactose 3, to which were added chemical compounds in quantities providing a total dry matter concentration in the medium corresponding to that secured from the use of the most active fraction.

The addition of individual amino acids alone exerted only a slight stimulus, but high penicillin yields were produced by the simultaneous addition of 1·5 per cent. glucose with leucine and tyrosine. Gelatine in amounts sufficient to give the equivalent of 140 mg. nitrogen per ml. medium provided a good source of mixed nitrogen-containing compounds. The addition of sugar alcohols, e.g., glycerol, gave yields of 160 mg. per ml.; monosaccharides in general were only slightly stimulatory, while of the di- and trisaccharides tested, 1·5 per cent. raffinose was the most effective. A further enhancement of the valuable properties of the gelatine-raffinose medium may be obtained by increasing the amounts of sodium chloride and lactose, 2 per cent. of the former and 4 per cent. of the latter, for instance, giving 300 units of penicillin per ml. in eight days.

Tobie (W. C.). **Aspergillin : a name misapplied to several different antibiotics.**—*Nature, Lond.*, clviii, 4020, p. 709, 1946.

The author considers it desirable to restrict the name 'aspergillin' to the black pigment of the spores of *Aspergillus niger*, thus designated by Linossier (*C. R. Acad. Sci., Paris*, cxii, pp. 489, 807, 1891; cli, p. 1075, 1910). This pigment, which has not been tested for antibiotic properties, has been repeatedly investigated and was described by Quilico (*Gazz. chim. ital.*, lxiii, p. 400, 1933) as a humic acid. Meanwhile, Bush and Goth, having applied the name 'aspergillin' to a compound of *A. flavus*, subsequently re-named it flavicin [*R.A.M.*, xxv, p. 227]; Stanley [ibid., xxiv, p. 111] applied 'aspergillin' to a crystalline compound from an unspecified strain of *Aspergillus*, but this is now [ibid., xxv, p. 514] considered to be similar to, if not identical with, gliotoxin; Soltys (*Nature, Lond.*, cliv, p. 550, 1944) referred to a filtrate from *A. fumigatus* as 'aspergillin' and Krasilnikov *et al.* [*R.A.M.*, xxv, p. 271] used it for an alcohol-soluble antibiotic produced from certain strains of *A. niger*. It is recommended that new names be selected for the antibiotics isolated by Soltys and Krasilnikov *et al.* if they prove to be new compounds.

Rao (R. R.), George (Mariam), & Pandalai (K. M.). **Pterygospermin : the antibacterial principle of Moringa pterygosperma, Gaertn.**—*Nature, Lond.*, clviii, 4021, pp. 745–746, 1946.

An antibiotic substance, which inhibited the growth of the acid-fast organism, *Mycobacterium phlei*, at a dilution of 1 in 30,000 and other organisms at from 1 in 30,000 to 1 in 75,000, has been named pterygospermin. The method of extraction from the root of *Moringa pterygosperma* [*M. oleifera*] is described.

Irving (G. W.), Fontaine (T. D.), & Doolittle (S. P.). **Partial antibiotic spectrum of tomatin, an antibiotic agent from the Tomato plant.**—*J. Bact.*, lii, 5, pp. 601–607, 2 figs., 1946.

Tomatin (previously designated 'lycopersicin'), an antibiotic agent occurring in Red Currant tomato (*Lycopersicon pimpinellifolium*) plants [*R.A.M.*, xxiv, p. 479], used at the rate of 5 units per ml., effectively inhibits the growth in pure culture of *Phytomonas* [*Xanthomonas*] *solanacearum*, *Fusarium oxysporum* [*F. bulbigenum*] f. [var.] *lycopersici*, *F. o.* f. *pisi* [*F. orthoceras* var. *pisi*], *F. o.* f. [var.] *conglutinans* [*F. conglutinans*], and other fungi.

Little (J. E.) & Grubaugh (K. K.). **Antibiotic activity of some crude plant juices.** —*J. Bact.*, lii, 5, pp. 587–591, 1946.

The crude, undiluted juices of a number of plants were tested for their activity against four human bacterial pathogens, seven phytopathogenic bacteria, and four species of *Fusarium* causing plant diseases.

The juice from a strain of Iowa Inbred maize resistant to bacterial wilt (*Bacillus* [*Corynebacterium*] *stewarti*) inhibited the growth of *C. stewarti* and *Erwinia carotovora* (inhibition zones of 18 and 10 mm., respectively); Wisconsin Jersey Queen cabbage (resistant to *F. oxysporum* f. *conglutinans*) [*F. conglutinans*] and wild mustard acted similarly on *Phytomonas* [*Pseudomonas*] *campestris* (10 mm.); and Ohio 31 cucumber (resistant to *E. tracheiphila*) on *E. carotovora* (10 mm.).

F. o. f. *niveum* [*F. bulbigenum* var. *niveum*] and *F. o.* f. *melonis* [*F. b.* var. *niveum* f. 2] both showed inhibition zones of 7 mm. in contact with wilt-resistant lines of Iowa Inbred maize; *F. conglutinans* and *F. o.* f. *lycopersici* [*F. b.* var. *lycopersici*] were similarly affected by Pan-American tomato (16 and 7 mm., respectively) and the Break o' Day variety (7 mm. in each case), both wilt-resistant; the latter also arrested the growth of *F. b.* var. *niveum* f. 2 (7 mm.), while the wilt-susceptible Bonny Best was antagonistic to *F. conglutinans* (16 mm.). On the other hand, all three tomato juices stimulated the development of *F. b.* var. *nivcum* and those of the yellows-resistant Penn State Ballhead cabbage and cauliflower W.S. 300, resistant to *P. campestris*, promoted the growth of *F. o.* var. *conglutinans*.

Limasset (P.). **Recherches effectuées en Angleterre sur les maladies à virus de la Pomme de terre.** [The researches carried out in England on Potato virus diseases.]—*Ann. Épiphyt.*, N. S., xii, 1, pp. 45–55, 1946.

This is a French abstract of the discussion on potato virus diseases held at a joint meeting of the Association of Applied Biologists and the British Mycological Society in 1942 [*R.A.M.*, xxii, p. 367].

Ross (A. F.). **Studies on the cause of stem-end browning in Green Mountain Potatoes.**—*Phytopathology*, xxxvi, 11, pp. 925–936, 1946.

At the Maine Agricultural Experiment Station a Green Mountain potato strain from Minnesota normally resistant to stem-end browning [*R.A.M.*, xxv, p. 573] was rendered much more liable to the disease by tuber- and inarch-grafting with scions of the very susceptible Keswick strain. The enhanced predisposition to stem-end browning was manifest not only in the year of grafting, but also in the progeny of the tubers produced by the grafted plants or seed pieces. Transmission was not effected in all cases of organic union between the grafted plants, nor was it obtained by mechanical inoculation methods. The tubers of a Minnesota lot acquired a rather stronger tendency to stem-end browning during the first year or two of field, but not of cage, cultivation in Maine; otherwise there is no change from one year to the next in the relative incidence of the disease developing in the resistant and susceptible strains, the former group including Green Mountain strains from Vermont, Highmoor, and Phillips.

The available data are interpreted as indicative of the presence in the highly susceptible potato lots of a virulent virus strain absent from the resistant stocks, which harbour a milder form of the same entity.

Snyder (W. C.), Thomas (H. Earl), & Fairchild (S. J.). **Spindling or hair sprout of potato.**—*Phytopathology*, xxxvi, 11, pp. 897–904, 2 figs., 1946.

The artificial infestation of White Rose potato plants with psyllids (*Paratrioza cockerelli*) under controlled conditions in California showed that typical spindling or hair sprout [*R.A.M.*, xxv, p. 573] may be a symptom of psyllid yellows due to

the colonization by the insects of the parent plants when approaching maturity. The form of the disease under observation is not transmissible through the tubers, nor was there any evidence of virus implication in its etiology. The spindling sprouts show no tendency to recover as long as their growth is entirely sustained by the tuber, but once they have struck roots into the soil normal development ensues. The yield of spindling-sprout tubers was roughly half that obtained from normally sprouting seed, but the second generation from diseased tubers completely recovered and their production was not impaired. Severely affected tubers may form no sprouts. In one experiment in which spindling-sprout tubers were stored for several months internal browning was observed, resembling that reported by Sanford and Grimble from Canada in connexion with phloem necrosis [ibid., xxiv, p. 70].

The correlation thus established between spindling sprout and psyllid yellows emphasizes the importance of psyllid extermination measures, notably in areas of seed-potato production.

Opitz (K.). **Weitere Versuche über den durch Viruskrankheiten herbeigeführten Abbau der Kartoffel.** [Further experiments on the Potato degeneration induced by virus diseases.]—*Pflanzenbau*, xvi, 9, pp. 323–342, 6 graphs, 1940. [Received January, 1947.]

The writer's series of parallel experiments on potato degeneration at Berlin-Dahlem and Bornim [*R.A.M.*, xvi, p. 828] were continued over the three-year period from 1937 to 1939 and resulted in the following grouping of the eight varieties tested: (1) fairly resistant, Ackersegen, Jubel, and Daber; (2) less resistant, Industrie, Robinia, Estimata, and Priska; and (3) least resistant, Weltwunder. The reactions of Robinia, Estimata, and Priska to the virus diseases responsible for degeneration fluctuated from year to year, and were particularly anomalous in the last-named, the yields of the first- to third-year progeny of which were scarcely inferior to those of the original stock despite fairly heavy infection.

As in previous years, healthy plants immediately adjacent to diseased ones developed specially severe symptoms, and in some cases an almost direct correlation could be established between the state of health of the progeny and the removal in the previous year of the infection focus to a distance of 5 to 6 m. Such incidental observations as were made on the influence of the wind direction on virus spread [cf. ibid., xxv, p. 311] pointed to a favourable effect on health of a site south of the infection focus. The prevailing west winds were not generally more conducive to virus dissemination than those from other quarters.

Late planting did not promote freedom from the viruses, streak [virus Y] in particular being conveyed to the young plants by the wingless aphids (*Myzus persicae*) active in July and causing heavy infection. Preliminary experiments in the control of the insect vectors by spraying the plants four or eight times during the growing period with nikotin, nikopren, or parasitol II gave encouraging results.

Roberts (F. M.). **Underground spread of Potato virus X.**—*Nature, Lond.*, clviii, 4019, p. 663, 1946.

During field experiments at Rothamsted Experimental Station it has been observed that potato tubers from plants adjacent to those infected by potato virus X were sometimes infected, although the haulms had not reacted when tested for the presence of this virus at the end of the season. While one explanation of this was that infection had occurred through the foliage late in the season and that the virus passed to the tubers without becoming systemically established in the haulms, it seemed no less probable that spread might have occurred underground.

After various experiments using healthy and infected tubers planted in the same pot with cellophane screens erected to prevent foliage contact in one of these there was a suggestion of spread without leaf contact [cf. *R.A.M.*, xvii, p. 832]. Tests on the haulms at the end of the season were negative in both the screened and unscreened pots, but the harvested tubers showed that spread had occurred in one of the screened pots.

Similar experiments with tomato, which is much more susceptible than potato to infection by virus X, and in which spread is much more rapid, showed that spread occurs equally well whether there is root contact only, or both root and leaf contact between infected and healthy plants. Pairs of healthy plants were used and when 5 to 6 in. high one was inoculated with the virus. Tests made eight weeks later showed that seven of nine uninoculated plants in the unscreened pots had become affected and five of nine in the screened. In a further experiment, employing a screen providing a continuous barrier between the infected and healthy shoots, the virus spread to all nine uninoculated plants (root contact only) and to seven of nine unscreened. All the control tomato plants in the same greenhouse, not in contact with infected plants, remained healthy. No evidence was obtained as to how the underground spread took place.

Reestman (A. J.). **De beteekenis van de virusziekten van de Aardappel naar aanleiding van proeven met gekeurd en ongekeurd potgoed.** [The importance of the Potato virus diseases in connexion with experiments on certified and uncertified seed.]—*Tijdschr. PlZiekt.*, lii, 4, pp. 97–118, 1 pl., 4 graphs, 1946. [English summary.]

A tabulated survey is given of four years' comparative investigations (1940–43) in Holland to determine the effects of virus diseases, especially leaf roll, on the yield of certified and uncertified 'seed' of some well-known commercial potato varieties. In general, the losses caused by potato virus X were less severe than those due to leaf roll, while leaf roll and virus X together or crinkle [virus X+ virus A] resulted in heavier reductions than leaf roll alone. Healthy plants with leaf roll-diseased neighbours produced larger yields than those with virus-free neighbours, and it was demonstrated graphically that the yield per plot of healthy plants increased *pari passu* with the number of plants affected by leaf roll.

In 1941 the differences in yield between healthy plants and diseased plants in a 50 per cent. leaf roll-diseased crop ranged from 35 to 51 per cent., and in 1942 from 33 to 63 per cent. of the yields of healthy plants. The Ultimus variety sustained much heavier damage than Triumph. However, taking healthy and diseased plants together, the reduction in yield in a crop with 50 per cent. leaf roll ranged from 11 to 19 per cent. in 1941 and from 6 to 24 per cent. in 1942. To a large extent, therefore, the loss was compensated by the increased yield of the healthy plants in the crop, generally amounting to between 5 and 7 per cent.

The average weight of the tubers rose with the yield, the increases being particularly marked in the light-cropping varieties. In 1941 the dry weight of the tubers from leaf roll plants was higher than that of sound ones in most varieties, but in 1942 the relative positions were reversed. There was no difference in this respect in 1943, but after grading the dry weight of small tubers from diseased plants was found to be higher than that of those healthy ones of the same size, whereas in large tubers the opposite was the case [cf. *R.A.M.*, xxiv, p. 245]. These observations apply to the tubers of plants with secondary infection. In the case of primarily diseased tubers the dry matter content is probably lower than that of healthy ones, judging by a planting test in which considerably more leaf roll developed in plants arising from tubers with a low dry matter content than from those with a high one.

Clinch (Phyllis E. M.). **Observations on a severe strain of Potato virus X.**—*Sci. Proc. R. Dublin Soc.*, N.S., xxiii, 28, pp. 273–299, 3 pl., 1944.

A severe disease, first observed by the author in 1934 in a single potato plant of a small crop of British Queen potatoes grown from certified seed in Co. Dublin, and subsequently detected in seed-potato stocks and in the field, was shown by inoculation experiments in 1938 to be caused by virus X only. The symptoms, which are considered, therefore, to be due to a virulent strain of virus X, are described in 32 potato varieties, in all of which, except three reacting by top necrosis only, a primary stage of leaf necrosis and defoliation is succeeded in the same year by severe mosaic and stunting. The virulence of the disease abated strikingly and regularly in all varieties during the third year of infection in the one clone. This is considered to be due to mutation of the virulent strain to a mild. Reasons are given for not accepting the hypothesis that the attenuation is due to sorting out of the mild strain from a mixture of the two. No evidence of such a mixture in either potato or tobacco could be obtained, and the symptoms in potato plants inoculated with the two strains were different from those infected by the severe strain only. There was, moreover, nothing to show that the mild strain multiplied or moved through its hosts more rapidly than the severe one, which was, on the contrary, highly infectious and became systemic in the potato and other hosts with a rapidity at least equal to, if not greater than, that of mild X [*R.A.M.*, xviii, p. 130; cf. xxii, p. 269].

Solanaceous hosts shown by inoculation to be susceptible were *Datura stramonium*, *Nicotiana glutinosa*, tomato, *Solanum nodiflorum*, *S. nigrum*, chilli, and White Burley and Orinoco tobacco.

Of a large number of non-solanaceous hosts tested by inoculation only *Lamium hybridum* reacted systemically; local lesions were induced in *Veronica agrestis*, beetroot, and mangold.

The physical properties and serological reactions of the severe strain are similar to those of other X strains; plants harbouring a mild strain could not be infected with the severe strain by sap inoculation, but were by grafting.

The U.S.D.A. Seedling 41956 was immune from infection with the severe strain, which passed freely downwards through intermediate scions of this variety in double-grafted plants over 2½ months old. Upward movement in plants of the same age and older was inhibited by the presence of the immune variety. The author considers that movement of the virus in potato stems is of two types, one passive and the other dependent on multiplication. The former is closely bound up with that of elaborated food materials (as in the case of tobacco mosaic) and the main path of rapid movement is downwards in the phloem. The multiplicative type of movement takes place in an upward direction, irrespective of the age of the plants, and probably traverses the parenchymatous tissues. It was not possible to demonstrate the presence of virus X in the intermediate scions of Seedling 41956.

Transmission of virus X to Majestic plants grown in contact with diseased plants was obtained, although on an average only 3 out of 11 tubers carried infection in 1940 and 7 out of 15 in 1941. None of the Majestic plants which were near, but not in contact, contracted the virus. The intolerant varieties Arran Crest and Epicure did not become infected even when grown in contact with diseased plants. Symptoms of the disease could rarely be detected in the Majestic plants in the current year of infection; moreover, the foliage was virus-free. It is thought that the virus passed from the contact leaves to the tubers in the food stream without spreading to the rest of the plant. The production of some healthy sprouts from infected tubers is explained on the supposition that the amount of virus reaching the tubers was small and that there was little or no multiplication there.

This severe strain of virus X resembles closely Salaman's X strain [ibid., xviii, p. 130] in its symptoms in several potato varieties (although in certain others it differed) and in other solanaceous hosts, and in its physical properties. Moreover, Salaman's observation that a more or less complete clinical recovery occurred ultimately in a clone when the stock was carried on by tuber in the greenhouse, in which case only X^G (a mild strain) could be found, indicates a further similarity. Severe X differs, however, from X^N in being more readily communicable by grafting than by sap inoculation, in that leaf drop is predominantly a first-year symptom, and infected tubers invariably give rise to diseased plants, sprouting not being affected.

White (N. H.). **Potato tuber rots.**—*Tasm. J. Agric.*, xvii, 2, pp. 235–241, 5 figs., 1946.

Brief, popular notes are given on the symptoms and control of the following tuber rots of potato found in Tasmania: pink rot, caused by *Phytophthora erythroseptica* and other *P.* spp. [*R.A.M.*, xix, p. 40], dry rot (*Fusarium caeruleum*) [ibid., xxiv, pp. 201, 384], watery wound rot, black wound rot, or leak (*Pythium ultimum*) [ibid., xx, p. 488], late blight (*Phytophthora infestans*), early blight (*Alternaria solani*), charcoal rot (*Sclerotium bataticola*) [*Macrophomina phaseoli*: ibid., xxiii, p. 187], jelly end rot due to environmental conditions, and secondary rots, chiefly due to *Bacterium carotovorum* [*Erwinia carotovora*].

In Tasmania, pink rot is most common in warm autumn weather, especially if the soil has been rather moist before the tubers were dug. Dry rot is probably the most frequent of the potato rots locally; it does not attack the potatoes while they are still in the ground, but is essentially a storage disease. It is most active in winter and spring, especially in early varieties. In the last few years there have been several instances of tuber rot due to *A. solani* locally. Blackleg (*Bacterium phytophthorum*) [*Erwinia phytophthora*] and bacterial ring rot (*Corynebacterium sepedonicum*) have not yet been recorded in Tasmania.

Late blight of Potatoes.—*J. Dep. Agric. Vict.*, xliv, 6, pp. 269–271, 2 figs., 1946.

Potato late blight (*Phytophthora infestans*) was first recorded in Victoria in 1909, and in 1910–11 it was responsible for an epidemic which destroyed 75 per cent. of the crop. Since that date the outbreaks of the disease have been few and mild, and 25 years' experience at the Department of Agriculture has shown that annual protective spraying against the pathogen is not an economic practice, except in isolated areas where environmental conditions may favour more frequent attacks. A brief, popular description is given of the symptoms and course of the disease, with directions for control along the usual lines.

Brown rot of Potatoes.—*Agric. Gaz. N.S.W.*, lvii, 10, pp. 541–542, 1 fig., 1946.

A note is given in popular terms on the symptoms and mode of infection potato brown rot (*Bacterium* [*Xanthomonas*] *solanacearum*), which is prevalent in the coastal districts, particularly in the north of New South Wales [*R.A.M.*, xix, p. 69]. In addition to the use of disease-free tubers and crop rotation with non-solanaceous plants, the cultivation of the resistant Katahdin variety is advocated and brief directions are given for treatment of the soil with sulphur on the lines found effective in Florida [ibid., xviii, p. 788].

Niederhauser (J. S.). **Sclerotinia sclerotiorum on Potatoes on Long Island.**—*Plant Dis. Reptr*, xxx, 8, p. 270, 1946. [Mimeographed.]

On 26th June, 1946, *Sclerotinia sclerotiorum* was found in two adjacent potato fields on the South Fork of Long Island, its occurrence so far north being unusual

in the United States. About 4 per cent. of the plants were affected, and the chief symptom was a general wilt of the whole plant or of a single stalk in a hill. The stem was attacked at about soil-level and a wound probably provided the infection court. No apothecia were found, but it is assumed that they were the source of infection.

GARRETT (S. D.). **A study of violet root rot. Factors affecting production and growth of mycelial strands in Helicobasidium purpureum Pat.**—*Trans. Brit. mycol. Soc.*, xxix, 3, pp. 114–127, 2 pl., 1946.

The maximum growth of mycelial strands on potato tubers (King Edward or Majestic), inoculated with 8·5 mm. disks cut from a growing colony of *Helicobasidium purpureum* [*R.A.M.*, viii, p. 527] on meat-malt extract agar and buried in glass jars filled with soil, was measured after about seven weeks by a paper scale fitted over the curved surface of the tuber.

With increasing storage age of the tuber the distance covered by mycelial strands and the frequency of infection cushions decreased. The smaller production and growth of strands from disks of inoculum cut from the growing margin of the culture than from those cut within a circle 8·5 mm. from the margin is considered to be due to the lesser mycelial density in the former.

Increasing concentration of nutrients in the agar, particularly that of malt, encouraged the production and growth of strands. The capacity of the inoculum disks from shallow cultures to produce strands declined with increasing age of colony after five to six weeks at 25° C., but not when double-depth agar (6 mm.) was used. Strand growth from disks from colonies transferred after three or four weeks' growth at 25° to a laboratory temperature of 15 to 20° for a further week or two was less than from those kept at 25° throughout.

Strand growth was greater in a soil–sand mixture (1 to 3) than in soil, and in the latter medium it was further reduced at medium and low, but not at high, soil-moisture content by soil acidity, the same reduction taking place in mycelial growth over Rossi–Cholodny slides [ibid., xv, p. 527].

ROSE (D. H.). **Handling and shipping early Potatoes.**—*Circ. U.S. Dep. Agric.* 744, 44 pp., 20 figs., 1 graph, 1946.

Included in the section of this paper dealing with damage to early potatoes from mishandling in the field and packing-house is an account of the relation of heat injury to bacterial soft rot (*Erwinia carotovora*) [*R.A.M.*, xxiv, p. 115], sometimes preceded by a darkening of the exposed side of the tuber and the leakage of juice at the lenticels. Temperatures approaching 90° F. are the most conducive to the development of the rot, which may occur, however, in a serious form in unrefrigerated consignments moved to market when the average temperature of the load does not exceed 70°. Both field and laboratory tests (the latter carried out with infra-red lamps) showed that bacterial soft rot is a sequel to injury from heat, as distinct from light, rays. In the case of freshly dug potatoes the only condition generally requisite for heat injury was that the flesh just below the skin on the exposed side should reach a temperature of 110° or upwards and there remain for at least 30 minutes. This degree of heat in the tuber corresponds to an air (shade) temperature of 90°, at or above which potatoes should not be lifted unless they can be transferred to shelter within 15 to 30 minutes.

CHILTON (S. J. P.) & TULLIS (E. C.). **A new race of Cercospora oryzae on Rice.**—*Phytopathology*, xxxvi, 11, pp. 950–952, 1946.

A new race of *Cercospora oryzae* [*R.A.M.*, xxvi, p. 80], designated race 6, is reported on rice in Louisiana and Texas. It attacks Rexoro and other commercial

varieties of Rexoro parentage, e.g., Bluebonnet and Texas Patna, as well as a selection known as Nirex. The differential varieties Blue Rose, Blue Rose 41, Caloro, and Fortuna are all resistant to the new race, and a similar reaction was shown by the commercial Acadia, Arkansas Fortuna, Arkrose, Asahi, Calady 40, Cody, Colusa, Delrex, Early Prolific, Hill Medium, Kamrose, Lady Wright, Magnolia, Nira, Nira 43, Prelude, and Zenith.

RAYCHAUDHURI (S. P.). **Mode of infection of Rice by Ustilaginoidea virens (Cke.) Tak.**—*J. Indian bot. Soc.*, xxv, 3, pp. 145–150, 1 pl., 1946.

Two different types of rice infection by *Ustilaginoidea virens* [*R.A.M.*, xx, p. 149; xxiv, p. 471; xxv, p. 139] were observed at the Central Experiment Station, Dacca, Bengal, one marked by the presence on the panicle of a few sclerotioid structures in place of grains and mostly empty glumes, and the other by a paucity of sclerotia, most of the glumes being normally filled although the hairs are sometimes infected by the greenish-brown spores of the smut. A thorough examination of the empty glumes of the first type showed that infection of the inflorescences takes place at a rudimentary stage in their development. The androecium and gynoecium were found buried inside the central core of the pseudoparenchymatous tissue of the smut ball. The anther walls were intact and the pollen grains preserved within, denoting the failure of fertilization and consequent absence of grain formation. Microtome sections of the smut ball showed disintegration of the ovary.

In the early stages of the second type of infection dense spore clusters were discernible along the two lines constituted by the interlocking palea margins, which are soon forced apart by the germinating spores; ultimately a wide passage is formed and they enter in large numbers, coming into contact with the pericarp. The epidermal and mesocarp cells were found to be the most susceptible to infection, undergoing disorganization at a very early stage. The cross cells are the next to be invaded, while the tube cells of the inner epidermis are still intact. As soon as the mycelium reaches the endosperm its growth is strongly accelerated, and eventually it replaces the entire grain. The spore ball continues to swell and the gap between the two paleae widens, so that yet more spores gain ingress. A green velvety mass is rapidly formed and the spores produced by the mycelium are extruded.

U. virens has been reported by Butler and Bisby [ibid., xi, p. 545] from Tinnevelly, Assam, Samalkota, and Madras, and it is also known to occur in Bombay, Bihar, and Orissa. Of the 16 rice diseases recorded by Wei in China [ibid., xiii, p. 652], false smut is listed as sixth in descending order of importance.

WALLACE (T.). **Mineral deficiencies of plants.**—*J. Inst. Brew.*, N.S., xliii, 4, pp. 181–187, 1946.

This lecture, read and discussed at a meeting of the Midland Counties Section of the Institute of Brewing on 21st March, 1946, embodies the results of the author's studies on mineral deficiencies of plants which have been noticed from time to time in this *Review*.

MALAN (C. E.). **Cystidiella valdensis, nuovo genere e nuova specie di Blastomiceti anascosporei.** [*Cystidiella valdensis*, a new genus and a new species of anascosporous Blastomycetes.]—*Mycopathologia*, iii, 3–4, pp. 255–261, 3 pl., 1943. [German summary.]

The author describes a new genus of the anascosporous Blastomycetes with articulations in the form of a cystidium, which he names *Cystidiella*. The new genus belongs to the Torulopsidaceae, and is near *Trichosporon*. The type species, *C. valdensis*, was found in the soil of a rye field in Piedmont.

Zogg (H.). **Die Blattdürre des Mohns.** [Poppy leaf blight.]—*Verh. Schweiz naturf. Ges.* cxxv, p. 172, 1945.

Pyrenophora [*Pleospora*] *calvescens* is the agent of a destructive opium poppy (*Papaver somniferum*) blight [*R.A.M.*, xxiii, p. 120] in the Zürich district of Switzerland, affecting the plant at all stages of its growth. Thus, the seedlings sustain heavy damage from damping-off, while girdling of the roots of older plants leads to collapse, spots develop on the stems and capsules, the leaves shrivel, and so forth. The writer's studies bore mainly on the reactions of the host to foliar infection, which consisted in (1) an increase in latex production, signalized by the appearance of milky drops on the under side of the leaf; (2) blue staining of the invaded areas, notably the leaf veins; and (3) a gummous line of demarcation (anti-toxic immune reaction) between the healthy and infected tissues. Of these responses only the third is specific, representing an attempt by the host to repel the fungal toxins, which succeeds only at temperatures above or below the optimum of 24° to 28° C. Under these conditions the infectious principle is localized but not eliminated.

Wiehe (P. O.). **Report on a visit to Trinidad, Louisiana and other countries.**—*Publ. Dep. Agric. Mauritius* 28, 119 pp., 14 pl., 1 fig., 8 diags., 5 graphs, 3 maps, 1946.

Matters of phytopathological interest are the subject of parts II, III, and IV of this report, dealing, respectively, with new sugar-cane varieties, originating at the British West Indies Central Breeding Station, Barbados, and recently introduced into Mauritius; plant protection and quarantine; and sugar-cane diseases, comprising comparative observations on the position in Louisiana and Mauritius in respect of red rot (*Colletotrichum falcatum*) [*Physalospora tucumanensis*], mosaic, and chlorotic streak.

Stevenson (G. C.). **Sugarcane varieties produced by the Sugarcane Research Station, and their value to the sugar industry of Mauritius.**—*Bull. Mauritius Sugarcane Res. Sta.* 18, 24 pp., 4 pl. (2 col.), 1946.

Of the sugar-cane varieties released for planting by the Mauritius Sugarcane Research Station, M.171/30 sometimes germinates poorly owing to pineapple disease (*Thielaviopsis* [*Ceratostomella*] *paradoxa*) of the cuttings, necessitating extensive replacements to fill the resultant gaps in the stand. The pathogen is amenable to control by immersion of the cuttings before planting in a fungicidal solution such as Bordeaux mixture [cf. *R.A.M.*, xxv, p. 524]. M.171/30 is also fairly susceptible to smut (*Ustilago scitaminea*), especially during periods of drought.

The performance of M.73/31 has often been exceptionally promising in the absence of red rot (*Colletotrichum falcatum*) [*Physalospora tucumanensis*], to which it is highly susceptible. The search for a satisfactory method of testing resistance to this disease of new varieties, discontinued during the war, is expected to be resumed shortly.

Susceptibility to red rot is also a great disadvantage of the otherwise successful M.134/32; the several types of reaction of this variety to *P. tucumanensis* have been described elsewhere by the author [ibid., xxv, p. 234].

M.112/34 is highly resistant to gumming disease [*Xanthomonas vasculorum*], but susceptible to a red spotting of the leaf sheaths caused by *Cercospora vaginae*. The symptoms induced by this quite innocuous fungus are liable to confusion with those of red rot, to which M.112/34 is resistant, and this may have delayed the propagation of this valuable cane. M.112/34 was once found infected by chlorotic streak in the cold, high-rainfall area of Savanne, and should not be grown where such conditions prevail.

CUNNINGHAM (G. H.). **Gasteromycetes of Australia and New Zealand.**—xv+236 pp., 37 pl., 1 fig., 1 diag., Dunedin, J. McIndoe, 1944. [Received October, 1946.]

This treatise, embodying the results of the author's intensive study, over a 20-year period, of the Gasteromycetes of Australia and New Zealand, aims at providing as complete a record as possible of the genera and species of the areas covered. The book comprises sections on the economic importance, spore dispersal, cytology, types of development, phylogeny, distribution, classification, and taxonomy of the group, a glossary, and a nine-page bibliography.

STEVENSON (J. A.). **Fungi novi denominati. II.**—*Mycologia*, xxxviii, 5, pp. 524–533, 1946.

The author gives technical descriptions of 12 further fungi [cf. *R.A.M.*, xxiii, p. 191], hitherto undescribed. *Physoderma paspali* n.sp. causes chocolate-brown, later ashen, spots on living leaves of *Paspalum plicatulum* in Puerto Rico. In advanced stages the spots are often overgrown by *Colletotrichum graminicola*. Bitancourt reported *Physoderma* sp. on *Paspalum millegrana* in Brazil (*Int. Bull. Pl. Prot.*, xii, p. 52M, 1938), but without descriptive notes. Other species on grasses, such as *Physoderma zeae-maydis* [*P. maydis*: *R.A.M.*, xxiv, p. 207] and *P. gerhardti* differ from *P. paspali* (the golden-brown, smooth sporangia of which measure 18 to 33 by 15 to 24μ) in their smaller sporangia and other distinctive characters.

Entyloma trigonellae n.sp., found on living leaves of *Trigonella foenum-graecum* in California, is characterized by amphigenous, circular to oval, light yellow sori 1 to 2 mm. in diameter, sometimes showing a greenish halo when dry, with spherical to subspherical, rarely ovoid, hyaline to yellowish spores 12 to 16μ in diameter, rarely 12 to 18 by 14 to 15μ, the wall being 1·5 to 2μ thick. The spores often show evidence of a gelatinous envelope which may form papillae on the spore wall.

Asterina (*Englerulaster*) *phoradendricola* n.sp. was found on living leaves of *Phoradendron flavescens* parasitic on pecan and various other hosts in Florida. *Chaetoseptoria wellmanii* n.sp., causing spots on living bean (*Phaseolus vulgaris*) and cowpea leaves in El Salvador, shows 3 to 10 scattered, immersed, later partially erumpent, amphigenous, membranous pycnidia per spot, measuring 120 to 170μ in diameter, with a definite, circular ostiole 15 to 25μ in diameter, with straight, erect 3- to 6-septate setae 5 to 6μ in diameter and 90 to 225μ long; and hyaline, acicular, straight or variously curved conidia, obtuse to truncate at one end and long-acute at the other, sparingly and indistinctly septate, and measuring 75 to 160 by 2·5 to 4μ.

Ovularia lupinicola n.sp. was found on living leaves of lupins in Washington and Colorado. *Septonema agaves* n.sp., found on living leaves of *Agave americana* in El Salvador, has smooth, light brown, branching, septate conidiophores up to 30μ long by 3 to 4μ in diameter; the conidia are 1- to 9-septate, shortly catenulate, verrucose, deep brown, not constricted at the septa, straight to slightly curved, cylindrical with rounded ends, and measure 15 to 45 by 5 to 6μ.

Cercospora lonchocarpi n.sp. is widespread on living leaves of *Lonchocarpus nicou* in Brazil and Peru, *L. urucu* in Brazil, and *L. chrysophyllus* in British Guiana. This leaf spot inducing fungus appears to be common wherever the host genus is grown in northern South America. It causes considerable defoliation at times, and may possibly become of economic importance.

OLIVE (L. S.). **Some taxonomic notes on the higher fungi.**—*Mycologia*, xxxviii, 5, 534–547, 4 figs., 1946.

These taxonomic notes on fungi collected by the author in the United States include an account of *Melanospora interna* [*R.A.M.*, ix, p. 62] apparently parasitic

on a *Fusarium* causing pod rot of groundnuts [cf. E. W. Mason, Annotated Account of Fungi Received at the Imperial Mycological Institute, List 11. Fasc. 2, p. 36, 1933].

CHAVES BATISTA (A.). **Estudos fitopatológicos.** [Phytopathological studies.]—*Bol. Agric., Pernambuco*, xiii, 2, pp. 51–60, 18 figs., 1946. [English summary.]

The following records are based on material collected in Bahia, Brazil. *Diplodina dianthi* n.sp. was isolated from carnations affected by foliar and stem blight, sometimes causing the death of the plants. The pathogen thrives at a temperature of 28° to 33° C. Its immersed, later erumpent, spherical to globose, carbonaceous, black pycnidia measure 160μ in diameter and are provided with a papillate ostiole, and the hyaline, elliptical, uniseptate conidia, 12 by 4μ, are borne on simple, hyaline, acicular conidiophores.

Another new parasite of carnations is *Amphichaeta diffusa* n.sp., which produces diffuse, circular, sunken, brown lesions, later darkening to black, on the foliage and stems, and is also responsible for post-emergence damping-off under warm, humid conditions. It is characterized by a stromatoid layer giving rise to immersed or erumpent black acervuli containing conidiophores on which are borne cylindrical, multiseptate conidia, with one part dark and the other hyaline, 16 by 6μ, with two cilia, each 6μ in length. Spraying with 1 per cent. Bordeaux mixture gives good control.

Cashew nuts (*Anacardium occidentale*) are attacked by *Dendryphiella cruzalmensis* n.sp., which induces the formation on the leaves of irregular brown spots, not exceeding 5 mm. in diameter. Shrivelling and defoliation ensue, but the damage to the plant is unimportant. The fungus produces intra- and intercellular hyphae and conidiophores with nodules or cyathiform appendages; the elliptical, multiseptate, dark, acro- and pleurogenous conidia measure 22 by 8μ. In potato dextrose agar cultures sporulation occurs after 48 to 60 hours; the profusely branched, dark, long, sterile hyphae are 4μ in diameter; chlamydospores were not observed.

Ascochyta sacchari n.sp. was isolated from Coimbatore sugar-cane plants bearing on the leaves elliptical, chlorotic, purple-bordered spots, 12 to 15 by 3 to 5 mm. It produces amphigenous, glabrous, circular, dark chestnut-coloured, immersed, later erumpent, ostiolate pycnidia, 96μ in diameter, and uniseptate, elliptical or cylindrical, hyaline conidia, 8 to 10 by 2 to 3μ.

Phyllosticta marantae n.sp. forms on the leaves of arrowroot *Maranta arundinacea* light brown, later confluent lesions involving large areas of the surface and resulting in desiccation and a consequent heavy reduction in the output of rhizomes. The immersed, later erumpent, globose, ostiolate, black pycnidia measure 108 by 100μ, and the oval conidia, less than 2μ in diameter, are produced in abundance; conidiophores are quasi-obsolete.

White-Pine blister rust quarantine (quarantine No. 63).—*U.S.D.A., B.E.P.Q.*, 4 pp., 1946.

A revision of the white pine blister rust (*Cronartium ribicola*) quarantine [*R.A.M.*, xviii, p. 80] reduces the areas of the United States in which the inter-State movement of five-leaved pines is regulated, provides for unrestricted inter-State movement of gooseberry and currant plants, except European black currants, into all parts of the country outside the control areas (containing five-leaved pine stands which are being safeguarded from infection by the pathogen), as designated in administrative instructions by the Chief of the Bureau of Entomology and Plant Quarantine; and abrogates the clause requiring the transport of gooseberry and currant plants in a dormant or defoliated condition, or their disinfection prior to dispatch to certain States.